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1922



Edinburgh Medical Journal

Edinburgh Medical Journal

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EDITED BY
ALEXANDER MILES AND J. S. FOWLER

January to June 1920

NEW SERIES—VOLUME XXIV

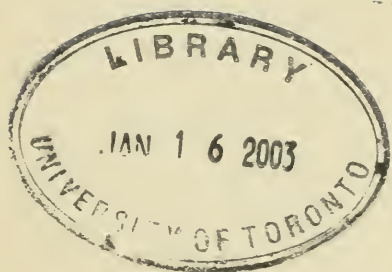
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Edinburgh Medical Journal

January 1920

EDITORIAL NOTES

WITH this number the *Edinburgh Medical Journal* enters upon the one hundred and sixteenth year of its existence. It appears with a fresh, although not a new imprint, and it is peculiarly gratifying to those who are responsible for its conduct, that the Journal should once more be issued from Tweeddale Court at the hands of Messrs Oliver & Boyd. For thirty-six years—from 1861 to 1897—the Journal was conducted by this famous old Edinburgh firm, with Henry Duncan Littlejohn, Daniel Rutherford Haldane, George William Balfour, and Joseph Bell as successive Editors. In 1897 it changed hands, and now, after an interval of twenty-three years, Messrs Oliver & Boyd are again responsible for its publication.

During its long career the Journal has been singularly fortunate in its publishers. It was auspiciously launched in 1805 under the ægis of Archibald Constable—the “Napoleon of the Press,” as Lockhart termed him—and for twenty-one years it bore the imprimatur of his press. In 1826 it passed under the care of Adam Black, another notable name in the history of publishing in Edinburgh, and seven years later the firm-name of Adam and Charles Black appeared on the title-page. After being in the hands of the Blacks for twenty-nine years it was taken over by Sutherland & Knox in 1855, and at this time Messrs Simpkin, Marshall & Co. became the London agents for the Journal. It is a source of gratification to us that this well-known firm is to this day one of the strong supports of the Journal in the Metropolis. In 1861 the Journal was acquired by Messrs Oliver & Boyd, and in 1897 by Mr Young J. Pentland, who carried it on till 1908, when a change was made in its management. The publication was then entrusted to Messrs William Green & Son, Ltd., who have recently, for reasons connected with their own business, withdrawn from its management.

Editorial Notes

THE Royal College of Physicians of Edinburgh have elected the following distinguished and representative men
**Honorary Fellow-
ships of the
Royal Colleges.** Honorary Fellows of the College, "in recognition of their distinguished services during the war":—
 Earl Beatty, G.C.B., G.C.V.O.; Mr Henry P. Davidson, Chairman of American Red Cross; Marshal Ferdinand Foch; The Viscount Grey of Fallodon, K.G., P.C.; Earl Haig, K.T., G.C.B., G.C.V.O.; Prof. A. Laveran, Member of the Academy of Medicine, Paris; Prof. Marchiafava, Vice-President of the Italian Red Cross, Rome; The Burgomaster Max of Brussels; The Cardinal Archbishop Mercier, Belgium; General Sir John Joseph Pershing, G.C.B., Commander-in-Chief of the U.S.A. Forces; Prof. Roux, Director of the Institut Pasteur, Paris; General the Rt. Hon. Jan Christiaan Smuts, P.C.; Baron Sonnino, Italian Minister for Foreign Affairs, Rome; The Hon. Sir Arthur Stanley, C.B.E., Chairman Joint War Committee British Red Cross and the Order of St John; Prof. William H. Welch, M.D., LL.D., Director of the School of Hygiene and Public Health, Johns Hopkins University, Baltimore.

The Royal College of Surgeons of Edinburgh have elected the following representatives of all the branches of the medical services of the Allies, Honorary Fellows of the College, "for distinguished services in the war":—Sir William Norman, K.C.B., R.N., late Director-General Naval Medical Department; Sir Robert Hill, K.C.M.G., C.B., C.V.O., Director-General Naval Medical Department; Lieutenant-General Sir T. H. John Goodwin, K.C.B., C.M.G., D.S.O., K.H.S., Director-General Army Medical Department; The Hon. Major-General William Rice Edwards, C.B., C.M.G., K.H.P., M.D., Director-General Indian Medical Service; Major-General G. L. Foster, C.B., Director-General Medical Services, Overseas Military Forces of Canada; Major-General Sir N. R. Howse, V.C., K.C.B., Director Australian Army Medical Service; Colonel W. H. Parkes, C.M.G., C.B.E., Director New Zealand Medical Corps; Colonel P. G. Stock, C.B., Director South African Medical Corps; Rear-Admiral W. C. Braisted, U.S.N., Administrative Head of the Medical Service of the United States Navy; Surgeon-General M. W. Ireland, United States Army Medical Corps; Médecin-Inspecteur-General Sieur, Member of the French Academy of Medicine and Professor of the Val-de-Grace Military Hospital; Lieutenant-General Leopold Melis, K.C.B., Inspecteur-Général du Service de Santé de l'Armée Belge, attaché à la Maison Militaire du Roi. Maggiore Generale Comendatore Lorenzo Buonomo, attaché to the Ispettorato di Sanita Militare, Rome; Surgeon-Director-General Professor Tadao Honda, Director-General Naval Medical Service (Japan).

Editorial Notes

THE following members of the College have been admitted to the Fellowship:—Thomas Arthur Ross, M.D., Glasgow; Robert Bathgate Johnston, F.R.C.S., Penrith.

**Royal College of
Physicians of
Edinburgh.**

The following have been admitted to the membership of the College after examination:—John Lindsay Boyd, M.D., Glasgow; Cyril Hocken Tewsley, M.D., Edinburgh; Robert Cecil Robertson, M.B., Ch.B., Glasgow; John Bowes M'Dougall, M.D., Glasgow; Leonard Bell Cox, M.B., B.Sc., Melbourne.

The Morison Lectures for 1920 will be delivered by Lieut.-Colonel Richard G. Rows, M.D. Lond., in the month of March.

At the Annual Meeting of the Royal College of Physicians of Edinburgh, held on the 27th November, Sir Robert Philip was unanimously re-elected President of the College for the ensuing year.

The Council for the year was elected as follows:—Dr A. H. Freeland Barbour, *Vice-President*; Dr F. D. Boyd, Dr George M. Robertson, Dr Robert Thin, Dr Lamond Lackie, Dr Harry Rainy.

At an Extraordinary Meeting on the same date Dr Jonathan Campbell Meakins was admitted to the Membership of the College.

The following distinguished and representative men, having accepted the offer of Honorary Fellowship, were unanimously elected Honorary Fellows of the College:—Professor Hermann M. Biggs, M.D., M. Georges Clemenceau, Professor Kitasato.

The Office-bearers for the year 1919-20 are:—*President*, Sir Robert William Philip; *Vice-President*, Dr A. H. Freeland Barbour; *Treasurer*, Dr Norman Walker; *Secretary and Registrar*, Dr J. S. Fowler; *Librarian*, Dr D. Berry Hart; *Curator of Research Laboratory*, Dr J. J. Graham Brown.

THE news of the death, on 17th November, of Dr Hugh L. Calder of Leith, will touch a much wider circle than the scene of his forty years' practice, for, to a scattered band of lady doctors and former residents of Leith Hospital, his passing will evoke a sense of personal loss; it was ever as a friend, rather than merely as teacher or "chief," that he was regarded.

**The late Dr Hugh
L. Calder.**

A personal pupil of Lister in the old Royal, with an enthusiastic admiration for the patient accuracy of his master, Calder, despite the incessant claims of a big general practice, maintained throughout a keen interest in surgery, and as surgeon to Leith Hospital, and teacher there of clinical surgery to lady students in the "eighties," he did splendid work. A man of extensive reading yet original in his ideas, with a keen clinical acumen, his teaching was characterised by a terse, incisive, descriptive power, apt—often homely—illustrations, and pithy comments; while in the theatre his promptness in emergency,

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rapidity, and deftness — notably in bandaging — were very striking. Keen, energetic, and self-sacrificing, he was a fine example of the best type of family practitioner; unsparing of his own far from robust health, he laboured unceasingly for his patients' welfare. A man of few words, everything that he said bore the imprint of his personality — absolute straightness, loyalty, and sincerity.

“ Those about him,
From him did read the perfect ways of honour.”

IN the course of his Presidential Address at the November Session of the General Medical Council, Sir Donald MacAlister referred to the proposal of the Royal College of Surgeons of Edinburgh to institute a higher diploma in Dental Surgery. This step, he said, had been taken “with a view to inducing its licentiates in Dental Surgery to pursue more advanced study after obtaining their primary qualification.” Later in the proceedings a report was submitted to the Council from the Executive Committee, “with a recommendation that the Council should recognise the Higher Dental Diploma for registration in the Dentists' Register as a higher qualification.” In submitting the report the President said the Executive had examined the conditions proposed, and were satisfied that the diploma required a considerably higher standard of knowledge and scientific skill than the ordinary diploma. They were of opinion that it was right to encourage dentists to advance in their profession, and that the Royal College of Surgeons of Edinburgh had instituted a valuable means to that end. The report and recommendations were adopted.

We understand that the Higher Diploma is open to others than the licentiates of the College, provided they comply with certain regulations and pass the necessary examinations.

THE Club recently formed under the name of the East of Scotland Overseas Medical Club is open to medical men who served on a foreign front. The main objects of the Club are to promote the spirit of comradeship and to keep alive the friendships forged under the stress of war.

The response which its inception has met from all parts of the country augurs eloquently for its success and usefulness, and a large gathering is expected at the First Annual Meeting and Dinner in the North British Station Hotel, Edinburgh, on Friday, 30th January 1920. Sir Henry Gray, K.B.E., C.B., C.M.G., M.B., consultant surgeon with the Third Army in France, will be the first Chairman.

Application for membership should be addressed to the Hon. Secy., Dr James Young, D.S.O., 29 Manor Place, Edinburgh.

THE INFLUENCE OF EDINBURGH ON M'GILL UNIVERSITY AND AMERICAN MEDICINE.

By JONATHAN MEAKINS, M.D.

MR PRINCIPAL, LADIES AND GENTLEMEN,—It is with a deep sense of pride strongly leavened with humility that I appear before you to-day. I have pride in the fact that your University—may I be permitted to say our University—has seen fit to appoint me as the first incumbent of the Christison Chair of Therapeutics. Humility I feel because I have a keen realisation of my responsibility, and a profound appreciation of the splendid traditions and example which I must strive to perpetuate. The names of Sir Thomas Fraser and Sir Robert Christison are sufficient to hold before me the high standard to which I must attain. This honourable position which I have been called upon to fill I consider a great compliment, not only to myself, but also to that University and country from which I come. Any qualification which I may have I have attained from their teaching and ideals. The parent-tree from which these are derived we look upon with gratitude and reverence.

The New Britains across the seas drew their inspiration of Democracy, Justice, and Freedom from the traditions of the Motherland. This has been a heritage beyond compare. But a gift of almost equal splendour was that given to the young men who came from those far-flung lands to these ancient halls of learning. It was here that they acquired the inspirations and knowledge which have had such a profound influence on the medicine of the New World.

I consider that I come to you to-day a humble ambassador, to offer tribute to the University that has done so much for my Alma Mater, and in that capacity pray let me recount in what manner this great benefaction was bestowed.

In the eighteenth century facilities for medical learning were practically non-existent in Canada. Those settlers who were qualified practitioners of medicine had obtained their training in Great Britain or France. The young Canadian could only obtain medical knowledge by apprenticing himself to one of these, while hospitals did not exist except as religious institutions controlled almost entirely by a self-sacrificing priesthood. The first native Canadian of the Province of

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Quebec, or French Canada, who went abroad for medical study was François Blanchet, who was born in 1776, and went to New York to obtain his education. On his return to his native land he soon tired of his chosen profession and devoted himself to journalism and politics. But he aroused the desire for foreign education in Jacques Labrie, who journeyed to Edinburgh in the latter years of the eighteenth century. On his return home, like his preceptor, Labrie entered politics and became a member of the Chamber of Assembly ; and it is to him and his medical colleagues that we are indebted for the institution of those tribunals which guard the honour of the medical profession in Canada.

The seed of medical ambition was then germinated, and the first-fruits were John Stephenson and Andrew Holmes, who likewise proceeded to Edinburgh where they obtained medical degrees, returning to Montreal about 1820. In association with William Robertson, a native of Perthshire, and William Caldwell, born in Ayrshire, both graduates in Medicine of Edinburgh University, they formed the first professional staff of a Protestant Medical Institution. About 1818 the Female Benevolent Society of Montreal procured a small building of four apartments, and called it the House of Recovery. Small as it was, and inadequate to meet the needs of the time, it became the germ of medical education in Canada. On 1st May 1819, such patients as were in the House of Recovery, together with the little property belonging to that establishment, were moved into a new institution which now assumed the title of the Montreal General Hospital. Considerable interest had been aroused in favour of this newly established charity, and it had risen to such a degree that in August 1820 sufficient funds had been raised to enable them to buy a new site on which to erect a modern building. The Medical Staff consisted of Drs Caldwell, Robertson, Holmes, and Stephenson. An institution attended by active and energetic physicians and supplied with abundant clinical material being now a fully established fact, the staff was naturally led to approach the vexed problem of medical education.

It will prove a matter of no little interest to see upon what reasons their conduct was subsequently based. At a meeting of the staff held on 27th October 1822, the subjoined resolutions were adopted :—

“ The medical officers appointed by the President and

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Directors of the Montreal General Hospital, having seen the great difficulties which the student in medicine in this country has to encounter before he acquires a complete knowledge of his profession, knowing the great inconvenience resulting to many from the necessity at present existing of spending several years in a foreign country to complete a regular medical education, and being convinced of the advantages which would result from the establishment of a medical school in this country, have met to consider of the possibility of founding such an institution in this city."

After due deliberation, they decided that certain considerations warranted an endeavour to promote so desirable an object. Those considerations which most interest us to-day are the following, which are taken from the Minutes of that meeting:—

"There can be but one opinion concerning the utility and necessity of a School of Medicine in this Province, seeing that the condition of Medicine in many parts sufficiently attests the want of opportunities of medical instruction. Such an institution will tend very much to remove this growing evil, by the facility it will afford of acquiring medical knowledge.

"They consider that the Montreal General Hospital is an institution which much favours the establishment of a School of Medicine in this city. It affords the student a facility of acquiring a practical knowledge of physic never before enjoyed in this province, an advantage which will be greatly enhanced by the establishment of lectures on the different branches of the profession.

"They are further encouraged to attempt the formation of a medical seminary, when they reflect that the Medical School of Edinburgh, the basis of which they would adopt for the present institution, now justly considered the first in Europe, is of comparatively recent formation, it being little more than one hundred years since medical lectures were first delivered in that city. And the early history of the Royal Infirmary of Edinburgh is not dissimilar to that of the Montreal General Hospital.

"In the event of the establishment of a Classical and Philosophical Seminary in this city, the two institutions would be materially benefited."

As a result, in 1822 lectures were publicly announced and given by some of the members of the staff of the Montreal General Hospital, notably Dr Stephenson and Dr Holmes.

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On the 4th February 1823, it was resolved to issue an advertisement, to be published in the principal Upper and Lower Canada newspapers, announcing the organisation of the "Montreal Medical Institution," and the intended delivery of a course of lectures during the subsequent winter.

The circumstances which rendered the success of such an institution probable, and the measures intended to be adopted for carrying the same into effect, having been submitted to His Excellency the Governor-in-Chief, he was pleased to signify his entire approbation of the plan.

It was therefore resolved to deliver lectures on the following branches of the profession, to commence on the second week of November next ensuing:—Anatomy and Physiology, Chemistry and Pharmacy, Practice of Physic, Midwifery and Diseases of Women and Children, Materia Medica, Surgery, and Botany.

The earliest session of which I can trace a record, was that of the year following, viz., 1824-25; and had in attendance but twenty-five students, a number which scarcely augmented for years. The institution, however, despite of all obstacles, pursued the even tenor of its way. The tickets of the lectures were acknowledged in Edinburgh, but at the ratio of two courses for one of that university; and as in those days it was a customary practice for every young man whose parents could afford it to complete his studies in some European school, and this more particularly in Edinburgh, a high tribute was thus awarded to the labours of the lecturers.

I must now go back a few years to recount events of great importance to Canadian education. On 6th October 1744 (175 years ago this month) James M'Gill was born in Glasgow, and received his early training and education in Scotland. When quite a young man he set out for Canada in search of fortune, and engaged successfully in mercantile pursuits, notably in the north-west fur trade, then one of the leading branches of business in Canada. Subsequently he settled in Montreal, and in partnership with his brother, Andrew M'Gill, became one of the leading merchants in what was then a town of 9000 inhabitants. His contemporaries describe him as a man of large and liberal heart, social and public-spirited, of moderate ability but of sound practical judgment and extensive information. He died in Montreal on 19th December 1813.

Being childless, James M'Gill had determined to devote a

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large portion of his fortune to some object of benevolence connected with his adopted country, and in his last will, made two years before his death, he set apart his estate of Burnside on the slopes of Mount Royal, together with the sum of £10,000, for the foundation of an English-speaking University, one of the colleges of which was to be called M'Gill College.

The management of the endowment was to be confided to a public Board then recently established by Act of Parliament, and named "The Royal Institution for the Advancement of Learning." His bequest was to take effect on condition that there should be erected within ten years, on the estate of Burnside, a university or college for the purposes of education and advancement of learning in the province of Lower Canada, with a competent number of professors and teachers to render such an establishment effectual and useful for the purposes intended.

Unfortunately considerable litigation occurred in regard to this will, and it was not until 1829 that the property was placed in the hands of trustees. According to the terms of the bequest it was necessary immediately to establish a university or college. At this time the eyes of the Royal Institution for the Advancement of Learning, and of the friends of education in Canada, were turned upon the Montreal Medical Institution, now an active teaching body of established reputation. Therefore it was decided to bridge the difficulty by making this body the Medical Faculty of the University. At a meeting held on 29th June 1829, the Montreal Medical Institution was formally engrafted upon the University of M'Gill College as the Medical Faculty. For some years the only active work done in the University was that in this Faculty, and by its simple fulfilment of the time limit of the will, it may justly be said to have saved the University. From this period the tickets of the lectures were accepted by the University of Edinburgh at par.

This, the first attempt at medical education in Canada, was undertaken by men coming from the Edinburgh School. They were filled with that high standard of medical requirement which they had received while studying under Gregory, Home, Duncan, and the other great Edinburgh teachers who made the Edinburgh Medical School the first in the world. They brought from Edinburgh her methods of medical teaching, and from the very origin of the M'Gill Medical School up to the present time we have continued on the foundation which they laid so truly.

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Edinburgh for some time had practised that method of medical teaching whereby the student came into actual personal contact with the patient. He followed the patient's condition from day to day, making careful examinations and notes of his physical condition and symptoms. He came into intimate contact with disease, and knew it as a concrete condition, not as a theoretical or philosophical argument. To walk the hospitals there, meant much more than it did in London or any of the continental cities. At that time London was years behind Edinburgh, nay, was copying the northern capital. Sir Robert Christison describes the condition in London in 1820 as follows:—"It was a frequent wonder to me, that so little use was made of the medical wards of St Bartholomew's for the purpose of instruction, and generally, that education in medicine was almost entirely neglected. While the medical students were only three in number, and, indeed, being all graduates, were no longer 'pupils,' though called so, the surgical students, amounting to several hundreds, never entered a medical ward, and, though pupils in reality, got no more information in medical practice than the few crumbs they might pick up now and then during the medical treatment of surgical cases. Nevertheless, men with only this training were passed annually in hundreds by the London College of Surgeons into the ranks of the general practitioners of England. I could thus easily understand subsequently the superiority of the general practitioners educated at Edinburgh, where medicine proper held a prominent place in the system of hospital instruction, the preference in which they were held in England, and their success and reputation, especially in most of the large English county towns." In short, Edinburgh was years in advance of London in the most important matters of medical education.

Notwithstanding the real value of Scottish methods and learning during this period and for many years after, the ardent spirits from the United States of America and Western Canada were attracted to England or the European Continent rather than to Scotland. These men returned bringing the methods of medical education practised at those centres. One finds very few Scottish names among the earlier leaders in the United States. 'I can recall only Ephriam MacDowall, the first ovariologist, and he gained his inspiration, it may be added, in Edinburgh, but he was an isolated worker and for long a prophet in the wilderness, and Scottish influence was largely wanting.

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Thus the small body of men at M'Gill University formed an isolated nucleus of medical educational traditions on a vast continent. Their early history was a protracted struggle, but they were fired with that persistence and faith which in time could not be denied. As years passed they were joined by other Edinburgh graduates—John Racey, Archibald Hall, Michael M'Cullough, Stephen Sewell, Arthur Fisher, and James Crawford, a steady succession of ardent spirits. In fact, in the last one hundred years there have been few exceptions to break a steady line of Edinburgh and M'Gill men occupying professoriate positions at the M'Gill Medical School.

During many years the other departments of this struggling seat of learning of the New World were little if at all developed; the spark of great things had not inspired them, but the time was drawing nigh when Edinburgh would in yet another direction give to this budding University the necessary sunshine to bring it to full bloom.

Up to 1855 the Principals of M'Gill University had been men of a theological training. They had striven to rear and guide this young institution, and at the same time to perform the arduous duties of a busy clergyman. Needless to say, their strenuous efforts were not a success. The Medical School in truth was flourishing, and was making a distinct impression upon American Medicine, but this was due solely to the men who formed its Faculty and its methods of teaching. At this juncture Sir Edmund Head was appointed Governor-General of Canada, and as such was *ex-officio* Visitor of the University. He had done a great deal for education when Governor of New Brunswick, and had taken an active part in the Royal Commission for his own University of Oxford. The Governors of M'Gill, therefore, took an early opportunity of waiting on him to solicit his aid and influence for the University. Sir Edmund Head entered cordially into their plans and suggested the name of Dr William Dawson as the new Principal.

Dr Dawson was a Canadian by birth, born in the town of Pictou, N.S., in October 1820. He had received his early education in the schools of Nova Scotia, which were closely modelled on the parish schools of Scotland, and later he went to Edinburgh. In 1854 the professorship of Natural History in this University became vacant through the death of Edward Forbes. On the advice of friends, Dr Dawson offered himself as a candidate, and prepared to go to Scotland personally to

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press his suit. While waiting for a steamer, a message arrived that the appointment had been made in favour of Dr Allman. "Then it was," to use Dr Dawson's own words, "that there occurred one of these coincidences which impresses one with the belief in a kind Providence over-ruling our affairs. Almost simultaneously with the news of the failure of the Edinburgh candidature, a letter arrived from the Hon. Judge Day, the President of the Board of Governors of M'Gill University, explaining the movements in progress for its improvement, and offering the position of Principal. I had made no application for this appointment, and knew little of M'Gill except that it had some reputation as a Medical School, whilst its academic faculty was in a comparatively unsettled condition."

Dr Dawson accepted this position, and with his coming a new era began in Canadian education. Trained in Edinburgh University, and having her traditions strongly in mind, it was not many years before he had inspired M'Gill, and was bringing its name into prominence amongst the great seats of American learning. During the long years of his Principalship, M'Gill made steady progress, and when the time came for Sir William Dawson, as he now was, to relinquish the guiding reins, it seemed like the hand of Fate that his successor should likewise be an Edinburgh man, namely, Sir William Peterson. And now when time has brought about yet further change, the tradition that an Edinburgh graduate should hold this important position in Canadian education is being unconsciously carried on. Only within the last year Sir Auckland Geddes, whom many of you will remember as a student within these walls, has been offered and has accepted the Principalship of M'Gill. This succession of Principals appears to be more than a coincidence, apparently continuing on account of the common traditions and inspirations of the two Universities. As a child turns to its parent in time of need, so M'Gill comes to this University for her leaders. In consequence, Edinburgh continues to exert her influence on Canadian education.

Although medical teaching in Canada was steadily attaining a recognised position, yet young men still journeyed to the modern Athens to obtain that knowledge for which she was so justly famous. Lister was struggling valiantly to obtain acceptance for the antiseptic theory and practice of surgery. Amongst the students of this great man Canadians occupied a prominent place, while a number of them were his intimate

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assistants and house-surgeons. I have but to mention Stewart of Halifax, Malloch of Hamilton, Grassett of Toronto, and Blanchard of Winnipeg, to demonstrate the influence which Edinburgh was continuing to exert on Canadian Medicine. These disciples returned with full faith in the Master and a complete understanding of his methods. It was of necessity but a short time before their efforts raised the surgery of Canada to a premier place in North America.

Time has not changed the custom of sending the young Canadians to study at Edinburgh, or of taking her graduates to occupy our professoriate positions. But few years have elapsed since Chipman left your ranks to join the M'Gill teaching staff, and the ship which bore me here passed in mid-ocean one bearing Dr Tait to occupy the Chair of Physiology at my Alma Mater. And so the steady stream continues to flow from here across the seas.

Such light as Edinburgh gave to M'Gill could not remain hidden under a bushel. By the eighth decade of the past century M'Gill had sent her graduates to the four corners of North America. On account of their splendid training and high efficiency they occupied an enviable place in the ranks of their profession. They held in America a position similar to that which Sir Robert Christison found his fellow graduates held in England. This was because M'Gill was the only Medical School in America that taught its students by the Edinburgh methods, and the time had now arrived when M'Gill would begin herself actively to influence exogenous medical education. In 1884, William Osler of M'Gill, now Regius Professor of Medicine at Oxford, was called to the Chair of Medicine in the University of Pennsylvania, and later to the Johns Hopkins Medical School. He took to his new work the great heritage. He is the pioneer to whom American Medicine must give thanks for bringing the Edinburgh method of clinical teaching to these leading medical schools, from whence it spread slowly but surely throughout the universities of the land.

A century has elapsed since that small body of Edinburgh graduates first banded together in a far land to perpetuate the ideals and traditions of their University. From such small beginnings one of the greatest seats of American learning has grown to maturity. Whereas, in 1823, the students in the Montreal Medical Institute were but twenty-five, at present the

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undergraduates in the Faculty of Medicine number close on five hundred. The solitary faculty with one professor and three lecturers has expanded slowly but surely, until now there are over ten composite faculties with more than seventy full professors and scores of associate professors, assistant professors, lecturers, and others. Such growth could not have occurred had it not been for the generosity of the citizens of Montreal. As I have recounted, this University was originated through the clear vision of a Scot whose name it bears. In the honour roll of those whose munificence has contributed to make it what it is to-day, Scottish sons occupy a proud and prominent place. One familiar with the annals of M'Gill University has but to recall the names of its benefactors to realise to what an extent Canadian education has to thank these pioneers of Scottish birth.

It was due to the munificence of two of these citizens that the M'Gill Medical Faculty acquired a great addition to her clinical facilities, and the people of Montreal an institution which at the time was considered the last word in hospital construction; for the founders stipulated that this should be so. Where were those responsible for the carrying out of these stipulations to procure the necessary help? The result was proof of their labours, as in time there arose on the slopes of Mount Royal the Royal Victoria Hospital, a replica of the Royal Infirmary of Edinburgh. I think the dedication which appears in the entrance hall of that Montreal hospital reveals to us the motive which prompted its founders. It is in part as follows:—This Institution shall be devoted to “the advancement of the art and science of healing and to the relief of the suffering poor.” What greater ideal than this could there be?

Now a few words as to the present medical teaching at M'Gill University.

During its whole history M'Gill has demanded much of her medical students. Since its inception it has required at least a four years' course of study. This was the more remarkable as for many years the other medical schools of America demanded but two. In the course of time, M'Gill was a pioneer in the requirement of five years' study in Medicine to obtain the Medical degree. Now still greater demands are being made on the medical students' time, and a six years' course has been instituted. This, however, has met with great opposition by those who do not hold that this is too much but that it is too

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little. Many are striving to obtain a higher matriculation, and in addition two years' study in the Faculty of Arts devoted to the scientific subjects and languages, four years' study in the Medical School, and one year's certified hospital residency, before the medical student be considered fit to obtain his degree. Seven years—it is a long time ; but, badly as Canada may need medical practitioners, she is realising that one of the greatest and most important assets a country may have is the well-trained, cultured, and broad-minded general practitioner.

The example set us by our founders we must continue. They tended with courage and love that tender seed which they brought so many years ago from this city—a high ideal of medical education. It has been passed on from generation to generation. The harvest has been increasing steadily, but still their followers struggle to reach that almost impossible ideal—a perfect medical curriculum. Their efforts nevertheless have not been in vain, as the record of Canadian Medicine during the past few bitter years have shown.

And now, Sir, I come to you, having been nourished with the bread which Edinburgh has cast so lavishly on the Canadian waters. It shall be my earnest endeavour, in so far as I have the power, to justify in some small measure the bounteous gifts which Edinburgh has bestowed upon my country and my University.

PRINCIPAL REFERENCES.—Adami, *Edinburgh Tradition*. Abbott, *Historical Sketch of the Medical Faculty of M'Gill University*. Hall, *M'Gill Medical Faculty—Past, Present, and Future*.

A BINET SCALE FOR THE BLIND.¹

By W. B. DRUMMOND, M.D., F.R.C.P.E.,
Medical Superintendent, Baldovan Institution.

PREFATORY NOTE.

THE Binet-Simon Scale is almost too well known to require description. It consists of a series of questions or problems arranged more or less in order of difficulty, and grouped according to the ages at which, as ascertained by experiment, children of average intelligence can pass them. A child of eight who can pass all the seven-year questions and none higher, is said to have a mental age of VII years. If he also answered three eight-year and two nine-year questions, his mental age would be VIII years—five scattered problems being considered equivalent to one complete year. The whole series forms a measuring scale by which general intelligence (as distinct from school knowledge, though some of the questions imply school knowledge) can be measured. The scale has been found very useful in practice for distinguishing mentally defective children from children who are merely dull and backward; for classifying the mentally defective; and for testing juvenile delinquents.

The interest excited by the Binet Scale has had highly fruitful results in stimulating research into the whole subject of tests of intelligence and capacity. When America "came into the War," the psychologists were mobilised and all recruits were subjected to a series of tests with the object not merely of eliminating the unfit, but of preventing square men getting into round holes. The latest claim for tests is that it is a "business proposition" for any firm employing a thousand or more workers to include a psychologist on the staff for the purpose of selecting the most suitable candidates, and of passing these on to the department in which their natural aptitude will be of greatest service to the firm.

The complete Binet-Simon Scale, with full directions, will be found in *Mentally Defective Children*, published by Arnold, London,

¹ This paper formed the basis of a thesis for the degree of M.D. of the University of Edinburgh, and is published by permission of the University and of the Medical Research Committee. The author is indebted to the Committee for a Grant.

A Binet Scale for the Blind

PART I.

In the beginning of 1915 the writer published, in *The Braille Review*, a paper on the Binet-Simon Tests, advocating the formulation of a scale of tests applicable to blind subjects. The chief object of the paper was to invite the co-operation of teachers in schools for the blind in seeking and trying tests which might prove suitable for the purpose. Although this paper was received with interest, its main object was unsuccessful, as those teachers who felt themselves qualified for the task suggested were too busy to undertake it. However, the principals of the schools named below were most sympathetic, and willingly provided the writer with every facility for examining the children under their care.

The problem of formulating standard tests for measuring the intelligence of the blind had already begun to excite interest in America, and Mr Irwin, Director of the Education of the Blind for the State of Ohio, drew up a list of tests which he arranged tentatively as probably suitable to various ages. Thus from four to eight tests were suggested for each year of age from 3 to 10, and for the ages of 12, 14, 16, and 18. He also issued a schedule for recording the marks of the subjects tested based upon the "Point Scale Schedule" of Yerkes and Bridges.¹ This schedule contained twenty-two tests arranged in the supposed order of difficulty. The tests in the Yerkes-Bridges Schedule which were unsuitable for blind subjects were replaced by other tests.

The point scale method of recording observations upon the intelligence of the blind has been tested by Thomas H. Haines,² who examined a considerable number of blind persons, and published his results in an elaborate monograph in 1916. Haines recommends a few alterations in the tests in Irwin's Schedule, and a considerable alteration in the order of the tests. He also details his experience with a number of tests not included in the point scale, and makes various suggestions with regard to the formulation of a year scale. Unfortunately, Haines examined very few young children. Out of 142 blind subjects tested, only four were under 9 years of age.

¹ *A Point Scale for Measuring Mental Ability*, by Yerkes and Bridges. Warrick & York: Baltimore, 1915.

² *Mental Measurements of the Blind*, by Thomas H. Haines, M.D., Psychological Monographs. Psychological Review Co.: Princeton, N.J., 1916.

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The present paper deals solely with the formulation of a year scale.

The Problem.—Blind children at the time they come to school are frequently found to be very backward in their physical and mental development, owing to errors in their early training. The natural tendency of anyone who has charge of a young blind child is to do everything possible for the child, not only to obviate the risk of accident but with the idea of compensating the child in some degree for his misfortune. In some cases foolishly excessive precautions are taken, to the extent even of keeping the child in bed for years. Treatment of this kind, however well meant, is prejudicial to the child. The normal child "grows by doing," and unless the child is allowed to do things for himself he will not grow at the normal rate or in the normal way. Thus it often happens that a blind child at the age of 7 or 8 years of age is extremely timid about finding his way about even in surroundings that should be familiar; is extremely clumsy in the manipulation of such articles as a spoon or cup; and is quite unable to button his own clothes or tie his own boots. In some cases, children whose physical activities are markedly behind the normal have yet a good knowledge of language and converse as freely as the average child of the same age; but in other cases, where the guardians have not recognised the necessity of talking to the child and taking him about, the capacity for speech may be limited to mere baby-talk, and the understanding of the child may be so limited as to make him appear imbecile. Hence blind children who are merely backward in their development run the risk of being regarded as mentally defective, and indeed it by no means infrequently happens that such children are actually certified as defective.

There are differences of opinion as to whether children who are both blind and mentally defective should be trained in a school for the blind or in an institution for the mentally defective. Probably the answer depends upon the degree of mental defect present. However that may be, it is obvious that a serious mistake is made when a blind child who is backward in mental development but is not feeble-minded is consigned to an institution for the mentally defective, where he cannot receive the kind of training which teachers of the blind are able to give, nor the stimulus which results from intercourse with other blind children who are physically and mentally his superiors.

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When a blind child who is suspected of being mentally defective is placed in a school for the blind, it does not usually take an experienced teacher long to discover whether the child is really feeble-minded or simply backward in intelligence. But it would obviously be useful for those who have to decide whether a blind child is or is not mentally defective *before* sending him to an institution, to have some simple means of finding out. It has been suggested that the Binet-Simon Scale of Intelligence Tests might serve such a purpose if it were adapted to the blind. Binet himself states that one of the chief uses of this scale is to distinguish between the child who is really mentally defective and the child of normal capacity who appears to be defective because for some reason or other his mental development has been retarded. He claims that children whose mental development has been so retarded as to result in their appearing to be mentally defective are frequently able to pass the tests suitable to their age. Consequently he lays down the rule that every child reported as defective by a teacher should be tested, and if he succeeds in passing the tests corresponding to his years, he is intelligent and must be treated as a normal child, but under a different teacher and preferably in a different school.

A Criticism.—The object of the present research is to establish a Binet Scale for the blind. Yet it must not be taken for granted that such a scale once established will be as useful in distinguishing between defective and backward blind children as in the case of seeing children. The success of the Binet Scale depends upon the justifiable assumption that all normal children have certain experiences and opportunities in common. All normal children, for example, have frequent opportunities of observing the primary colours and of learning their names. By the time a certain age is reached one may count upon the child being able to name the colours. No doubt some children, such as those who have their attention specially drawn to colours in a kindergarten or a Montessori school, may learn to name colours at an earlier age than those who do not have such opportunities. But the opportunity comes to all within a comparatively restricted period, and consequently Binet has been able to utilise the ability to recognise and name the primary colours as a test which children of a certain age *ought* to be able to accomplish.

Of blind children it is impossible to predicate a similar

uniformity of experience. As we possess no traditional method of training blind children, such children are subjected to very diverse methods of treatment, and consequently derive very diverse impressions from their environment. Moreover, the term blind child is a very indefinite one, including children who cannot see at all, children who can see in various degrees, children who have been blind from birth, and children whose mental development was aided by normal sight for various periods.

What is a Blind Child?—For the purpose of the present investigation any child whose sight is so defective as to make him a suitable pupil for a school for the blind has been considered a blind child. In the schools visited the teachers were asked not to submit for examination any children they considered feeble-minded. Otherwise the children were taken without selection. It was very apparent that the differences referred to above had a great influence upon the ability of the children to pass some of the tests. Children who have had normal sight for a number of years and have then become blind, *e.g.* as the result of an accident, have a very different mentality from children who have never been able to see. Such children continue to use visual images, and these assist them greatly in tackling some of the tests, such as Binet's card puzzle. Other children again, though nominally blind, retain a sufficient amount of sight to assist them in the same and similar tests. Several children in each school visited could recognise and name colours.

Since the above was written Haines has also drawn attention to the importance of taking these differences into account in endeavouring to formulate a series of tests suitable for blind subjects.

Four groups of subjects may be distinguished in institutions for the blind:—1. Those whose vision is sufficiently good for the Binet tests for sighted persons. 2. Those whose vision is insufficient for some of the ordinary tests, but who can see their way about or can distinguish wooden cubes placed on a white background, and can thus perform the Knox cube tests. 3. Those who are totally or almost totally blind, but who lost their sight at a sufficiently late date to continue to use visual imagery. 4. Those who are totally or almost totally blind, but who lost their sight at such an early age as to possess no useful visual imagery.

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These groups (somewhat differently defined) are recognised by Haines, who suggests quite arbitrarily that the age of five years should be taken tentatively as separating groups 3 and 4.

Schools visited.—Through the courtesy of the principals, practically all the children in the Royal Blind Asylum School, Edinburgh, and Henshaw's Blind Academy, Old Trafford, Manchester, were tested, while in the School of the Blind Asylum, Glasgow, all the children were tested up to the age of eleven. Altogether 100 blind children were tested, of whom four were excluded as mentally defective or too nervous to be fit to be tested. In addition, 88 sighted children were tested with certain tests with their eyes closed.

Tests used.—Besides the Binet tests, a number of additional tests were used, as detailed below. Some of these were original or were suggested by friends, others were obtained from various sources, especially from a list drawn up in connection with an investigation at present proceeding under the auspices of the Board of Education of the State of Ohio. The children were tested individually in a quiet room, and all the children appeared to be quite at their ease with the exception of those mentioned above as having been excluded.

Standardisation and Grading of Tests.—It is very important to avoid personal variations in the use of tests; otherwise comparisons between the work of different observers are without value. Unfortunately, in some cases Binet's own directions are somewhat vague. In the scale subsequently given in detail more definite instructions are given when necessary.

With regard to the tests in the Binet Scale, two things require to be determined in respect to each test: (1) whether the test is a suitable one for blind subjects; and (2) whether the test should be graded for the same age as in the case of sighted children.

1. It is an interesting fact that one can obtain a very good series of tests suitable for the blind, simply by eliminating from the ordinary Binet Scale all those tests which for their accomplishment require sight. At least three of Binet's tests for each age can be passed successfully by blind subjects. Some of these tests, however, are much more difficult for the blind. The recognition and naming of the coins in ordinary circulation, for example, can be accomplished by a few blind people, but by so few of even the older children that this test

must be excluded from the scale. The other test with coins, which involves giving change for a shilling, must also be excluded. It is an easier test than the other, but very few blind children succeed in passing it, partly owing to the difficulty in distinguishing the smaller coins by touch, and partly because blind children do not gain the early familiarity with money which is the lot of ordinary school children who from a very early age are accustomed to accompany their mothers to shops and to be sent messages which necessitate the bringing back of change.

2. With regard to tests which can be accomplished by blind children, it is obvious that we ought not to take for granted that any test in the Binet Scale is properly placed for the blind. Each test must be tried upon a number of intelligent children, and its place in the scale determined by the result. There is no unanimity as to what proportion of children of a particular age must pass a given test before that test can be graded as suitable for that age. Binet himself is quite vague as to his own procedure. In some cases he says a test is suitable for a particular age because at that age "all the children pass it." In other cases he says "most of the children pass it."

When tests which have already been graded for sighted children are applied to the blind, it seems reasonable that the place of these tests in the scale should not be changed too readily, seeing that we wish to compare the intelligence of the blind child with that of sighted children. Moreover, the children met with in a school for the blind differ from the children met with in an ordinary school in that a larger proportion of them are below the average in their intellectual endowments, and a larger proportion have been retarded in their mental development by gross errors in their early training. For these reasons I have considered a test suitable for a particular age if it could be passed by a simple majority of the children examined. This procedure seems the more justifiable from the fact that the small numbers of children available of a given age might yet contain two or three who were obviously dull and stupid, and whom no one would have selected as fair specimens of the blind child of that age. Of course the grading of the tests in the scale is purely tentative. It will have to be revised by the testing of much larger numbers of children, who must be selected by the teachers who know them as being of fully average intelligence.

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Tests from the Binet Scale suitable for the Blind.—The following tests from the Binet-Simon (1911) Scale have been found suitable for the examination of blind children. Several of the tests, however, will require to be shifted to other years.

Binet Tests suitable for the Blind.

Age.	Test.
III . . .	1. Can show eyes, nose, and mouth. 2. Repeats two figures. 4. Knows name.
IV . . .	1. Tells whether a boy or a girl. 2. Names common objects, <i>e.g.</i> a boot, a spoon, a plate. 3. Repeats three figures.
V . . .	1. Tells which is heavier of two weights. 3. Repeats a sentence of ten syllables. 4. Counts four pennies.
VI . . .	1. Tells whether morning or afternoon. 2. Defines common objects in terms of use. 4. Counts thirteen pennies.
VII . . .	1. Shows right hand or left ear. 3. Executes a triple order. 4. Tells value of three pennies and three half-pennies.
VIII . . .	1. Tells differences between objects from memory. 2. Counts backward from 20 to 0. 4. Knows day and date. 5. Repeats five figures.
IX . . .	2. Defines objects in terms higher than use. 4. Names the months in order. 5. Gives sensible answers to simple problems.
X . . .	1. Arranges five weights in order. 3. Sees absurdity in certain statements. 4. Gives sensible answers to certain problems. 5. Makes a sentence to include three given words.
XII . . .	2. Makes a simpler sentence containing three given words. 3. Gives sixty words in three minutes. 4. Defines abstract words.
XV . . .	1. Repeats seven figures. 2. Gives three rhymes to a given word. 3. Repeats a sentence of twenty-six syllables. 5. Explains an incomplete account of some incident.

Additional Tests:—I. THE TRIANGLE.—Material: a flat piece of wood in the form of an equilateral triangle with sides $3\frac{1}{2}$ ins. long. Six straight pieces of stick about 6 ins. long—*e.g.* six hexagonal pencils—round pencils being apt to roll out of place.

Say to the child, "Take this piece of wood and feel it carefully to find out its shape. Then take some of these sticks and

lay them on the table so as to show me the shape of the wood." The child may spend half a minute in examining the wood, but must not be allowed to feel it again after laying it aside. If the sticks are laid so as to form a recognisable triangle, the child is marked +. The corners need not be absolutely accurate, but should be nearly so.

This test is very instructive to the examiner, as it brings out very distinctly the difficulty blind children have in manipulating material, and also how little they appreciate form as compared to sighted children of the same age. Any young blind child who accomplishes this test easily and expeditiously will probably be found to have become blind at a period subsequent to infancy, or to retain a sufficient amount of sight to be able to form visual images of forms.

Sighted children succeed with this test at quite an early age, though tested with their eyes shut. Thus of fifteen 6-year-old children so tested, twelve were successful; of twenty-two 7-year-old children, eighteen were successful; of fifteen 8-year-old children, fourteen were successful; and of fifteen 9-year-old children, all were successful. Among blind children complete success is not found till the age of fourteen, *i.e.*, at that age all those tested were successful. These children were studying mathematics and had thus become familiar with triangles. Of younger blind children the passes were: at 8 years of age, two out of eight; at 9, four out of nine; at 10, eleven out of eighteen; at 11, seven out of eleven; at 12, seven out of nine; at 13, seven out of ten.

Blind children often appear impressed by the points of the triangle, and arrange two sticks thus **L**.

2. THE SQUARE.—This test is similar to the last, but a square piece of wood with sides measuring 4 inches is used instead of the triangle. This test is slightly more difficult than the triangle, but not much. Blind children often attempt to make the form by laying the pencils side by side. When they have put all the pencils in place they seem satisfied.

3. THE DIAMOND.—This test is the same as the last except that the piece of wood used is diamond-shaped instead of square. Its angles measure 30° and 60° . This test is more difficult than the two former. At fourteen years of age all the blind children tested were successful, but at earlier ages the proportion of successes was much smaller than in the case of the triangle and the square.

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These are useful tests, but it is not possible to grade them in terms of Mental Age owing to the wide range of individual differences. At 13 years of age only four children out of ten were successful with all three tests, yet one child of 6 years was successful. This latter child, however, was in advance of his years, his mental age being at least eight. He was expert in the use of his hands, and passed the test of arranging five weights, which Binet assigns to the age of 10.

4. **ÆSTHETIC TEST.**—This test is intended as a substitute for Binet's test of recognising the prettier of two faces.

Material required: six pieces of cloth each about 4 ins. square, viz. coarse canvas and tweed; silk and stout linen; velvet and serge. All should be of the same colour, preferably dark. Give the child each pair in turn and say, "Feel these and show me which feels nicer." In a later series of observations the following are used, as suggested by Irwin:—(a) Serge and silk, (b) velvet and serge, (c) velvet and carpet.

5. **PUZZLE TEST.**—This is simply a modification of Binet's card puzzle, which he assigns to the age of 5 years. The test may be carried out according to Binet's directions, but blind children naturally find it much more difficult than sighted children. The test may be modified by using very stout card, and handing the pieces to the child instead of laying them on the table. The pieces should be superposed with the right angle of one opposite the right angle of the other, thus
This, of course, necessitated turning one of the pieces over, which doubtless makes the test a little more difficult.




Instead of card one might use thin pieces of wood, which would be easier to handle, and if the test were carried out in accordance with Binet's instructions one side of the pieces might be bevelled at the edges, or markedly roughened all over one side, so that the child might notice if he turned a piece over accidentally. Binet himself directs that if the child turns one of the pieces over accidentally the observer should reverse it again.

The advantage of using card is that the material for the test can always be procured readily.

Give the child the undivided card and say, "Feel this piece of card carefully. I have another piece exactly the same which I have cut into two. I shall give you the two pieces, and I want you to fit them together again so as to make the same shape as the card you are feeling." As with other tests involving

manipulation, blind children vary greatly in their ability to perform this test. It is not till the age of 13 that two-thirds of the children are successful, yet some children of 5 or 6 may succeed.

Haines used for this test two blocks of wood $2\frac{1}{2} \times 4$ ins., $\frac{1}{2}$ in. thick, but bevelled to $\frac{1}{4}$ in. at the edges. One of these was cut along the diagonal. The pieces were laid on the table thus:—. The bevel prevents an apparent fit when one piece is turned over. The blind subject gets the two pieces off the table and manipulates them up near his face. Four 10-year-olds, and twenty-five older (up to 21) were all successful.

6. NAMING THE DAYS OF THE WEEK.—Binet makes ability to name the months in order one of his tests for 9 years. Ability to name the days of the week in their proper order comes two or three years earlier. We may grade it as a six-year test.

7. REVERSING FIGURES.—Say to the child, "I am going to say two numbers to you. Listen carefully, and then say the same numbers backwards. Thus, if I say 3, 4, you must say 4, 3. Now listen—2, 7." If the child succeeds in reversing the numbers, try again with three, then with four numbers, and so on. One success out of three trials for each set of three counts a pass. The average number of figures which the blind children tested could reverse were: at 5 years two, at 7 years three, at 11 years four, and at 13 years five.

8. SUGGESTION TEST.—This test was used as a substitute for Binet's test in which the child is asked which is the longer of each of six pairs of lines. Five weights all of equal size and of the same appearance were used, but weighing respectively 6, 9, 12, 15, and 15 grammes. These we may call A, B, C, D, D'. Two weights were taken and one put into each of the child's hands, and the child was asked "Which is the heavier?" Both weights were then taken from the child, mixed with the others behind a screen, and the process repeated six times altogether. The pairs used in succession were AD', BD', CD', DD', DD', and DD', the weight D' being put back into the same hand on each occasion. This test did not turn out to be satisfactory. Very few of the children tested, even at the higher ages, were successful. (Haines, for this test, made use of cubes of different sizes. A subject who resisted the suggestion that the right cube was the larger twice out of three times (trials 4, 5, and 6) by giving either left larger or both the same, was counted

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successful. At 10 years, five of seven passed; at 11, six of six.)

9. FINGER-TAPPING TEST.—This test is suggested by Irwin, and is based on the Knox Cube Test, which is as follows:—

Material.—Five wooden cubes.

Method.—Place four of these upon the table between the examiner and the subject. The cubes are placed about 3 ins. apart, in a line parallel with the subject's front. Say to the subject: "Do you see these cubes? Now, please watch closely, and do exactly as I do." The examiner now taps out with the 5th cube the lines as indicated. The taps are half a second apart. Having tapped out a line, he places the 5th cube upon the table near the subject.

Key to Lines.—Cube 1 is to the right of the examiner and to the left of the subject.

A. 1-2-3-4.	X. 1-2-3-4-3.	B. 1-3-2-4.	E. 1-3-2-4-3.	H. 1-4-3-1-2-4.
Y. 1-2-3-4-2.	C. 1-4-3-2.	F. 1-4-3-2-4.	I. 1-3-2-4-1-3.	
	D. 1-4-2-3.	G. 1-3-1-2-4.	J. 1-4-2-3-4-1.	

Scoring.—If the subject begins by making wrong moves, but corrects himself, it is correct. The following test is proposed as being adapted for the blind:—

"Have the subject place upon his thigh his left hand, or the hand other than that of preference, with the palm upward and the fingers spread well apart. Take a pencil, and touch as you would touch the cubes for the seeing subject, his four fingers, the index finger of the hand corresponding to cube 1. The time between taps should be as in the directions in the Knox Cube Test, half second between taps. His instructions should be given by means of line A as an illustration. 'Do you feel these touches? Note the order. Now, attend closely and do exactly as I do.' Then hand him the pencil.

"This is a very novel procedure to many blind children, and with young children line A must be repeated several times before the subject learns the procedure expected of him."

This test was tried on a number of blind children, but further observations are necessary before an opinion can be expressed as to its value.

10. SIMILARITY TEST.—This is a modification of one of Binet's Tests for the age of 8 years, in which the child is expected to tell the *difference* between objects named—a fly and a butterfly; wood and glass; paper and cloth.

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Say to the child, "You know what coal is?"—"And wood?" "Very well; tell me any way in which coal and wood are alike." If the child states the difference between coal and wood, do not say he is wrong, but say, "Now, listen again. Tell me how coal and wood are alike." Young children often persist in telling the difference. Question the child in the same way with respect to a ball and an orange; an apple and a banana. This test is a little more difficult than the difference test. It may be graded as a nine- or a ten-year-old test. Of nine-year-old blind children three-fourths passed, of ten-year-old children, eleven out of twelve. Two correct answers to the three sets constitutes a pass. Only one likeness is required in each case. Haines required three correct replies to five pairs. His results make this a high ten-year-old test for the blind.

11. PLAYING SHOP.—One of Binet's nine-year-old tests consists in playing shop, the child being required to give change for a shilling. For this test the following may be substituted in the case of blind children.

Material.—Three small cubes and three larger ones.

Method.—Say to the child, "Would you like to play at shop? Very well, you will be shopkeeper. You have here three little blocks which cost a halfpenny each, and here you have three big ones which cost a penny each. If I buy them all how much will you charge me?" Place one of the child's hands on the small blocks, and the other on the large ones. This may be graded tentatively as a nine-year-old test. Children as young as six were correct in their reply, but several ten-year-old children failed.

12. SHOWS EXAMINER'S RIGHT HAND.—This and the next are new and non-standardised tests suggested by Irwin.

Method.—Have the subject seated facing the examiner with the knees of the latter within easy reach of the subject. Say to him, "My knees are opposite your knees. My hands are on my knees. I am going to ask you a question. Think carefully before answering. Do not answer until I say 'All right.'" Then say, "Show me *my right* hand; now wait and think." Emphasise "my" and "right." After five or six seconds, say, "All right, now show me." After he has done this, say, "Show me my left hand." A new test, not standardised. Record answers.

Irwin suggests 11 years as appropriate for this test, which may be correct. Among the children tested the proportion of passes in successive years varied irregularly. Two

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children of 5 were tested and both were correct, while children of 12 and 13 failed. Perhaps the older children are more apt than the younger to respond impulsively without stopping to think. Hence the necessity of warning the child not to reply until the signal "All right" is given. Haines considers this a six- or seven-year test, but he did not test a sufficient number of children to justify such an opinion—only one child of 7, and none of 6; a few at higher ages.

13. ORIENTATION TEST.—"The subject, standing, is faced to the north and told he is facing north. He is then asked to point to the east, west, and south. Draw a rectangle upon the record sheet. Mark it north, and draw arrows pointing in the directions which he points for east, west, and south, marking them E., W., and S., mapwise. In like manner face the subject east, tell him he is facing east and ask him to point south, north, and west. Draw another rectangle upon the record sheet, marking it east, and draw arrows indicating the directions in which he pointed for south, north, and west. A new and non-standardised test. Record results."

This test also is graded by Irwin as appropriate for 11 years. This is really a school test, the grading of which must depend upon the age at which the children begin the study of geography. Of thirty-three children tested, the youngest successful was 10 years of age. Of five ten-year-old children, three were successful.

14. FABLES AND THEIR MORALS.—A simple fable with an obvious moral is told to the child, who is then asked to say what lesson the story is intended to teach. Thirty-eight children were tested. In sixteen cases from one to three fables were told to the children individually and the child gave his answer verbally; in twenty-two cases the fables were told or read to the children in class and the children were asked to write their answers immediately after hearing each fable. This is a fairly high-grade test. No child under 11 was able to give a single correct generalisation, and the only child who gave correct generalisations in all three cases was 14 years of age.

The fables used were—(1) The Fox and the Crow; (2) The Milkmaid; and (3) The Stork and the Cranes.

Method.—Say to the child or children:—

"A fable is a story which is meant to teach a lesson. I am going to read you a fable. Then I shall ask you to tell me what lesson you think the fable is intended to teach.

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"1. *The Fox and the Crow*.—One day a crow found a fine piece of meat and flew into a tree carrying the meat in her beak. The fox wanted the meat, and ran to the tree, and began talking to the crow, saying, 'Oh, Mrs Crow, I hear you have a beautiful voice. People say it is lovely. Do let me hear you sing.' On hearing this the crow was greatly pleased, and opened her mouth to try to sing. Immediately the meat fell to the ground, and the fox ran away with it.

"2. *The Milkmaid*.—A milkmaid was going to market carrying a pail of milk on her head. She began thinking to herself, 'With the money I get for this milk I shall buy some eggs. I shall put these under the hens, and get a lot of chicks. When the chickens grow, I shall sell them and buy a fine dress. Then I shall go to balls and parties, and all the young fellows will want to marry me. But I shall be very proud and have nothing to say to them, but will just toss my head like this.' And she tossed her head, and down fell her pail, and all the milk was spilled.

"3. *The Stork and the Cranes*.—A farmer was greatly annoyed by the cranes coming to steal his corn, so he set a trap to catch them. When he came again, he found he had caught not only some cranes, but a stork. The stork, seeing the farmer, called out, 'Oh, Mr Farmer, I hope you will spare me. I am not a thief, and it is quite by accident that you caught me. Do let me go.' But the farmer said, 'Oh, no. I have caught you along with these robbers, and you must die with them.'"

This test is doubtless affected by school instruction, but unless the children have actually heard the fables and been instructed as to their significance, they do not appreciate their meaning until their intelligence is well developed. In fact, it seems to require what one may call an "early adolescent intelligence" to appreciate the fable and apply its lesson to human life in the form of a generalisation. Many children who do not really appreciate the true meaning of a fable will yet give a generalisation of some kind, and it has been suggested that approximately full marks should be given in such cases (*e.g.* four marks out of five), the answer being held to indicate a capacity for generalisation and therefore a fairly advanced intelligence. A study of the actual replies of the children, however, shows that such an easy rule for indicating the value of the answers is not applicable. In some cases a general answer is pure nonsense, while in many more an unimpeach-

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able moral generalisation is given by children who do not understand the fable in the least, but who, being asked for a moral, repeat any maxim which they have learned which seems to them likely to please the questioner. As an example of this sort of reply the following may be quoted. A boy of 9 says that the "Fox and the Crow" teaches us to be kind to our enemies and to love them." This is nearly as wide of the mark as the reply of a seeing child who wrote, "This story is to teach us where to put our commas and full stops."

(To be continued.)

OBSERVATIONS ON BERI-BERI AMONG THE CHINESE IN FRANCE.

By A. R. LEGGATE, Captain R.A.M.C.

In 1917, when the Chinese were arriving in France, we had in the Chinese General Hospital 269 cases of beri-beri. In recording my observations I will confine my remarks mainly to Types, Cause, Symptoms, and Treatment.

Types.—There are two types, the wet and the dry. In the former the first symptom is anasarca. Every part of the body may be œdematous, but the œdema is most easily detected and usually most severe in the lower limbs. In the latter there is no œdema whatever.

Cause.—The view that the occurrence of beri-beri was intimately associated with a diet in which *polished* rice bulked too largely was first published in this country in 1901. My observations support this view.

In April 1917 a shipment of coolies left China. The M.O. in medical charge was B. M. Richardson, Lieut. R.A.M.C., and according to him the coolies got two meals per day of steamed cooked rice with meat and vegetables. The rice eaten was *unpolished* Canton rice of rather poor quality. No case of beri-beri was seen on board.

In contrast with this is the report of R. M. Bradley, R.A.M.C., who had charge of another shipment of coolies which left China in April 1917. The diet was chiefly of polished rice and the average consumption was 1.73 lb. per head per day. The first case of beri-beri was seen on or about the thirty-seventh day after embarkation. One month after beri-beri appeared they reached a port, but before reaching port 7 cases of beri-beri had died. Many were suffering and none had improved. At this port the M.O. succeeded in obtaining 15 bushels of unpolished rice, only sufficient to give to beri-beri cases. Four days thereafter general improvement was noted and no death occurred.

On disembarkation he had 36 cases of beri-beri, and of these 25 were admitted to hospital. Another excellent report is from Lieut. E. F. Wills, R.A.M.C., who had medical charge of a shipment of coolies. It gives indisputable evidence that beri-beri is associated with a diet of polished rice. I will give a few extracts only:—"Food had been put on board on the

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outward voyage at Hong Kong. The rice was Saigon rice. This forms the staple food at the two daily meals. Saigon rice goes through a process of steaming, and is then highly polished, leaving absolutely no pericarp. Major Rockwood, R.A.M.C., at Colombo described this as the worst rice for beri-beri. On reaching Colombo there were 46 cases of œdema. A medical board was appointed and condemned the rice, and ordered daily allowance of one of these:—Peas, beans, dahl. Ghee was also ordered. Finally, 20 of the 46 were left on shore; the remainder recovered. After leaving a South African port the supply of peas and beans gave out. Beri-beri again occurred, and on reaching the next port of call 20 cases were being treated. The medical authorities there secured a supply of peas, etc., sufficient for the remainder of the journey. Patients were given one ounce (daily) of yeast made from hops, and at every meal peas, beans, or lentils were served out. On reaching the port of disembarkation, only 2 or 3 showed slight traces remaining.

Symptoms.—Beri-beri is one of the many types of peripheral neuritis, and one of its peculiarities is that it is usually, not always, associated with œdema. The three main symptoms of the disease are: œdema, loss of deep reflexes, and paræsthesia. Paræsthesia takes the form of numbness and formication, sometimes the former only, less often the latter only, but usually both. Before deciding whether a case was positively beri-beri we always waited for the appearance of at least two of these three symptoms.

Some of the cases admitted to the hospital were beri-beri, but in its early stages with only one symptom. That symptom, under suitable conditions, disappeared in a few days.

Of the cases admitted to hospital 200 showed œdema of the legs and body, but of these 46 showed no other symptoms. 183 showed loss of deep reflexes, and of these 7 had no other symptom. 155 had paræsthesia, 9 of these without any other symptom.

These figures indicate that the first symptom usually exhibited is œdema, the second is paræsthesia, and the third is loss of deep reflexes. That is the order in which the symptoms usually appeared in our cases, and when all three symptoms were present, that is the order, almost invariably, in which they disappear.

The place where œdema usually begins, and where it is most easily detected, is in the lower limbs, but it affects the whole body more or less.

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Absence of the deep reflexes is, when the disease has progressed to any extent, the most constant symptom. The triceps, knee, and Achilles jerk all disappear. But before this happens it is very common to have them exaggerated for a day or two.

Paræsthesia is the second most common symptom. Numbness and formication is most often complained of. In an ordinary case these sensations are confined to the lower limbs and the lower part of the abdomen. In two cases the lips were one of the earliest parts to be affected. In the early stage, and also in the stage when the symptoms have, for the most part, disappeared, paræsthesia is confined to the inner sides of the thighs and the lower part of the abdomen. Small patches of anæsthesia were occasionally noticed in some cases, but these were rare and transitory. Tactile sensibility, however, is in most cases deranged to some extent.

Tenderness of the calves is said to be a symptom of the disease, but this in my experience is the exception and not the rule. In only one case when I tried to elicit this symptom did the facial expression indicate that there was pain.

Inability to rise from a squatting position without the aid from the hands or other assistance was a striking feature of some of our patients. The one peculiarity which I noticed about this symptom was that whereas in the dry type it is the rule, in the wet type it is the exception. Of 154 wet cases, 10 showed this symptom, *i.e.* 6.50 per cent. Of 53 dry cases, 35 showed this symptom, *i.e.* 66 per cent.

In three of these dry cases, the weakness of the lower limbs was so marked that they were bedridden for many weeks. One of them at his worst could stand without help, but dared not move for fear of falling. The second of them could move round the bed with the help of his hands. The third developed, to a very marked extent, wrist and foot drop. None of them, while lying with the knee extended, could raise the heel off the bed. The second and third and also another case demonstrated a peculiarity, which was first pointed out by Lieut.-Col. G. D. Gray, R.A.M.C., the Officer Commanding, Chinese General Hospital, and that is, that when paresis or paralysis of the feet manifests itself, the first part to become affected is the great toe. In that digit the paralysis appears first, and passes off last.

Another symptom which is not common, but in at least six cases the first symptom complained of, is diarrhœa. It

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sometimes proves somewhat intractable but does not seem to have the weakening effects in cases, say, of dysentery.

In no uncomplicated case was there a rise of temperature, and the fact that there was no loss of appetite was well demonstrated.

Paresis of the larynx was well marked in four dry cases. Loss of voice was what the patients complained of.

Cardiac weakness, as indicated by dilatation of the heart and dyspnœa, is seen in well-marked cases. In cases which proved fatal, the immediate cause of death is said to be heart failure. None of our cases were fatal, although some, at times, were very weak, and dyspnœa was distressing. The dyspnœa, however, was due, to a large extent, to the lungs being like every other tissue in the body, œdematous. Effusion into the scrotal and other serous cavities was marked.

Of the dry cases two only complained of dyspnœa.

As a rule, we may say that in an uncomplicated case of beri-beri there are no febrile symptoms, no loss of appetite, and no quickening of the pulse.

Treatment.—In acute cases where diarrhœa is a prominent symptom, or where, as sometimes happens, gastric symptoms supervene, these have to be treated on the usual lines. Weakness is a common symptom. Rest in bed, therefore, is of the first importance.

When œdema is marked, I consider a liberal exhibition of purgatives is advisable. A saturated solution of magnesium sulphate, with 15 minims of acid sulph. dil. to every ounce, is my favourite.

The first score or so of beri-beri cases that came under my charge had had, for the previous five weeks, no fresh vegetables. Most of them and many others complained of sore mouths and lips, and had other scorbutic symptoms. I believed that the want of fresh food had something to do with the cause of the beri-beri as well as the scorbutic symptoms. Accordingly I prescribed fresh vegetables. Every man got onions, four ounces daily. Many of these, probably most of them, were eaten raw. One orange daily was also given, as well as potatoes, and carrots. The scorbutic symptoms soon cleared up, but with the beri-beri symptoms it was otherwise.

During this period the prescribed diet for Chinese coolies included one pound of rice per head per day. The rice they got was of the finest quality, but polished. No other kind was available. The diet was a liberal one. The beri-beri cases

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were getting four ounces of onions more per head per day than the other patients, or those coolies who were out in the Labour Companies working, and yet they complained that they did not get enough.

This went on from 21st April to 9th May, and during that time there was little general improvement. On 9th May the rice ration for beri-beri cases was substituted by flour. In three days general improvement was noted, and in six days the œdema of some of the most œdematous cases had completely disappeared. Two of the cases complained of the number of times they had to get up in the night, the kidney secretion was so abundant.

That the stopping of the rice diet had a most marked and immediate effect on the œdema there is no room for doubt. The paræsthesia disappeared much less quickly, and the deep reflexes returned very slowly indeed. Two of the cases were repatriated as unfit after six months.

The evidence that beri-beri is a vitamine deficiency disease was emphasised by the marked improvement which followed the substitution of polished rice by wheaten flour.

Recent researches have shown that yeast is more rich in vitamines than any other known substance. Our patients were accordingly given half an ounce of baker's yeast two or three times a day. Eggs, also rich in vitamines, formed a part of the daily diet. Beans, much praised by some observers, were given to some of our later cases, but as these cases were few, no general conclusions could be formulated.

In cases of paralysis, massage and electricity were applied daily, and helped to avoid muscular atrophy.

If treatment is begun in the earliest stages of the disease a speedy recovery may be looked for, but if the disease has advanced and the deep reflexes are absent, and groups of muscles show weakness, recovery will be a process of months.

Summary and Conclusions.—1. Beri-beri is a disease associated with a diet of polished rice.

2. Inability to rise from a squatting position is a symptom which is usually confined to the dry type.

3. In coolies who are fed mainly on polished rice, the disease may show itself in from forty to fifty days.

4. An important part of treatment consists in discontinuing polished rice diet, and administering yeast, eggs, beans, and peas, and in the œdematous type, purgatives.

CLINICAL RECORDS.

REPORT OF PATIENT SIX YEARS AFTER THE IMPLANTATION OF A HOMOPLASTIC BONE GRAFT.

By HENRY WADE.

CASE.—On the 12th August 1913, W. W., aged 27, was admitted to the Royal Infirmary, Edinburgh. He came on the recommendation of Dr Barrie of Hawick, and complained of inability to move his right arm at the shoulder joint.

One week prior to his admission, when playing football he slipped and fell upon his shoulder. When he rose he experienced a feeling of numbness in the limb and found he could not move his upper arm. Any attempt at movement, whether active or passive, caused very severe pain. On the day of his admission to hospital an X-ray photograph was taken of the right shoulder joint, and the appearances seen were characteristic of the presence of a myeloid sarcoma of the upper end of the shaft of the humerus which had thinned the bone and produced a spontaneous (pathological) fracture of it, involving the articular surface of the head of the humerus and communicating with the joint.

Two years prior to admission he had sustained a fracture of the right arm through the level of the insertion of the deltoid muscle. This fracture appears to have healed satisfactorily, except that since that time he has noticed that his right shoulder joint was a little stiff and movement of it was not quite so good as on the other side.

On the 14th August the operative treatment was carried out. Through a vertical external incision the upper part of the shaft of the humerus and its head were exposed and found to be expanded by a central myeloid sarcoma. The head and upper portion of the shaft were removed, six inches of bone in all being taken away. A cuff of periosteum was detached from the shaft, one and a half inches above the line of section, and left attached to the lower portion of bone.

The operating morning on which this patient was treated had been so arranged that the previous case operated on was that of a man, aged 67, whose lower limb was amputated through the lower third of the thigh for senile gangrene. This patient had been previously examined carefully, and was considered a suitable subject from which to obtain a heterogeneous bone graft.

The lower end of the shaft of his femur, with the articular cartilage covering it, was rapidly dissected away from the amputated limb with

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the customary aseptic precautions. Six inches of the femoral shaft were divided vertically into four segments, one of which was implanted to make good the deficiency of bone removed. The portion of the articular cartilage of the femur on the graft implanted was laid in contact with the glenoid cavity, and the lower end of the graft was fitted into the periosteal cuff attached to the upper end of the unremoved portion of the shaft of the humerus. No further effort was made by plates or other means to unite the graft at its lower end to the humerus, as such proceedings were considered as liable to interfere with the vitality of the tissue implanted.

The divided muscles were sutured over the graft and the skin united.

His convalescence was uneventful, and he left hospital less than one month after admission.

The X-ray photographs taken prior to his discharge showed little if any change in the graft implanted. The upper end of the divided humerus had, however, formed a certain quantity of new bone that was fixing the graft in position. At the time of his discharge from hospital a certain amount of movement in this situation could be made out.

One month after his return to Hawick, that is two months from the date of the operation, he resumed his occupation as a mill worker, and has continued in this occupation without interruption up to the present time.

When examined in November 1919 a firm mass of bone is felt occupying the position in which the graft was implanted. This new bone is firmly united to the shaft of the humerus. The patient can move his shoulder joint freely and without discomfort in all directions, except full abduction. The deltoid muscle is partly atrophied, but contracts on voluntary effort.

The X-ray photographs taken show the upper end of the shaft of the humerus surrounded by a cuff of bone. The contour of the graft implanted is lost except at its upper end, being replaced by a mass of bone of irregular contour. The upper end of the implanted graft is still clearly visible, and the articular surface of the femoral condyle is seen lying in contact with the glenoid cavity of the scapula.

COMMENT.—The result that has followed the operative treatment in this case has given the utmost satisfaction to the patient, as it has enabled him to continue to follow his occupation for the last six years. The source from which the new bone formed, to replace the portion of humerus removed, has been derived, is of academic interest.

In my opinion, the evidence available warrants the conclusion that it has arisen in part from the bone cells of the femur

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implanted. The persistence of the articular surface of the femur that lies in contact with the glenoid cavity has produced a new joint with excellent range of movement. The atrophy of the deltoid and the limited degree of abduction could have been diminished, in my opinion, if the shoulder joint had been maintained in the attitude of full abduction for several weeks after the operation, instead of having been fixed parallel to the patient's side.

A CASE OF ENTRANCE OF AIR INTO A VEIN.

By ALEXANDER MILES.

TEACHERS of surgery in the 'eighties laid considerable stress on the risks attending the entrance of air into the veins in the course of operations within what they described as the "dangerous area," which included the lower part of the neck and the upper part of the thorax, particularly the axilla and the subscapular region. Although they seldom spoke from their own experience of this accident, the graphic descriptions they gave of its dramatic effects, and the precautions they took to avoid it, made a deep impression on the minds of their pupils, and left a haunting fear which not even prolonged immunity has served to dispel.

Nor would it appear that they themselves were merely handing on a tradition from their own teachers, for we find that men of the periods of Benjamin Bell, Liston, Percival Potts, Syme, Guthrie, and Cooper make little or no mention of it. Sir William Fergusson refers to it, but does not exaggerate its danger. He quotes the opinion of Dr Rose Cormack (then Editor of this Journal), "that the alarm on this score is greater than the occasion justifies; . . . though a few globules, which may accidentally be admitted, cannot do that harm which some have imagined, the danger should always be held in view."

A still earlier generation, which includes some great names, seems to have been responsible for the legend. Following Beauchesne's original record in 1818, we find cases reported by Dupuytren, Amussat, Delpech, Roux, Velpeaux, Malgaigne, Warren, Mott, and other distinguished surgeons.

In excising a tumour from the neck of a young woman,

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Dupuytren heard a prolonged blowing sound in the wound. "If I were not so far from the air tubes, I should think we had opened them," said Dupuytren. The words were scarcely uttered when the girl exclaimed, "Je suis morte"; she trembled and fell dead.

With the advent of anæsthesia, the recorded cases, for reasons which can readily be understood, became less and less frequent. In his *Science and Art of Surgery*, Erichsen gave the subject considerable prominence in a disproportionately long section, based on a contribution made to this Journal many years before (1844). This text-book had considerable influence in the 'eighties, and to it may be traced the teaching of that period.

That this complication cannot altogether be ignored, however, may be illustrated from the following note on a case which occurred in the writer's practice recently:—

CASE.—While clearing the axilla in the course of an operation for cancer of the breast, a large gland was found adhering to the axillary vein, and, in attempting to separate it, a narrow slit was made in the wall of the vessel. A finger was immediately placed on the hole in the vein, and on removing it to apply forceps, a short high-pitched hissing sound, almost amounting to a whistle, was audible to those around. The finger was immediately replaced on the proximal side of the opening, and the sound ceased. The anæsthetist, Dr J. H. Gibbs, who heard the sound and suspected its cause, observed no change in the patient's appearance, and neither the pulse nor the respiration was affected. While a lateral ligature was being applied to close the opening in the vessel wall, I became conscious of a curious rhythmical swishing sound proceeding from the patient's chest. This became louder and louder till it was quite audible to everyone present. On listening directly over the heart, the sound suggested the churning of a frothy mass within the cavities. It reached its maximum in about a minute, then gradually disappeared. There was never any detectable change in the pulse or respiration; and the blood, which continued to ooze from the surface of the wound, was unaltered in appearance. The patient showed no ill effects either at the operation or afterwards. There seems no doubt that the sounds we heard were due to the entrance of air into the vein and its mixture with the blood in the heart. Fortunately the quantity of air indrawn was not sufficient to give rise to serious symptoms, but the incident is a reminder that this accident may occur.

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SURGICAL TUBERCULOSIS.

By JOHN FRASER, F.R.C.S.

THAT tuberculous disease may be acquired before birth, either through the ovum or spermatozoon, or by trans-placental infection, was at one time widely believed. This view gradually fell out of favour until the opposite extreme was reached, and certain authorities entirely denied the possibility of such an infection. At the present time a moderate view holds favour, and there is every reason to believe that cases of congenital tuberculosis occur. MacFadyen and MacConkey¹ have reported a case in which injection of the mesenteric glands of a still-born infant into guinea-pigs caused tuberculosis. Gaffky² has reported a similar experience in the case of a child who died one day after birth.

This question of a possible pre-natal origin in certain cases of tuberculosis has two practical bearings which are of considerable importance from a surgical point of view. The first bears upon the degree of latency of which the tubercle bacillus is capable. Experimentally such a possibility was indicated by Maffucci's experiments, and later by the investigations of Baumgarten,³ Gärtner,⁴ Koch and Lydia Rabinowitsch,⁵ and Weber and Befinger.⁶ These observers worked with eggs, and one of the outstanding points of their experiments consisted in the fact that after injection the disease made no progress as long as the chick remained in the egg, the tissue of the embryo appearing to be resistant to the growth of the tubercle bacillus. Having previously inoculated eggs with tubercle bacilli, Koch and Rabinowitsch could find no complete tubercle bacilli when the eggs were examined at a later date, but they saw here and there little round coccoid forms, stainable by carbol-fuchsin, and these they believed to be tubercle bacilli in a latent form.

It is impossible to apply any such experimental test to the human embryo and foetus, but if a corollary may be drawn from such experimental evidence, it is obvious that it has an extremely important application. The evidence can only be read as meaning that the embryonic and foetal tissues possess a powerful retarding effect upon the growth of the tubercle bacillus. This influence will certainly be continued for some time after birth, and it is possible that such an influence may, to some extent, explain the low proportion of tuberculous infection which occurs in the first six months of life.

The question of the retarding influence of embryonic tissues upon organismal infection offers a rich ground for further research. Murphy

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and Rouss⁷ have investigated a very similar problem from the point of view of infection of the embryo with malignant cells, and their results have been such as ought to stimulate a wide field of research in similar problems.

There is evidence to show that individual tissues under certain conditions vary in their resistance to tuberculous disease. At the experimental station of the Royal Commission on Tuberculosis at Blythwood Farm,⁸ investigations were made on the question of congenital tuberculosis in cows, and this fact was brought to light, namely, that there is an enormous difference in susceptibility to tuberculous disease of the pregnant and the virgin uterus. The latter, like skeletal muscle, is very insusceptible to tuberculosis, several hundreds of heifer calves, many of them suffering from acute generalised experimental tuberculosis, on examination showed no sign of uterine disease. On the other hand, of six cows similarly infected, three were found with tuberculous disease of the uterus. Such a discrepancy can be no coincidence—whether it depends upon the alterations in blood-supply of the pregnant uterus, or whether it is the result of a specific tissue resistance, it is impossible to say with our present knowledge.

The question certainly demands further investigation, and if a specific tissue resistance is the explanation of the phenomena, it opens up a most interesting train of thought with wide possibilities of application to diagnosis and treatment.

As to the actual portals through which the disease enters, recent work has added little or nothing to the knowledge which we formerly possessed. Of the three possible avenues of infection the skin is the least important, but Tubby has recently stated that, in his opinion, tuberculous dactylitis owes its origin to infection through abrasions of the skin of the hands or feet. In certain cases he believes he has been able to trace a direct infection from a child crawling about a floor upon which a phthisical parent was frequently spitting. We find it difficult to credit such an explanation. Tuberculous dactylitis is a form of spina ventosa in which the central disease of the bone originates undoubtedly in a blood-vessel infection, embolic in character, and in practically every case the primary source of infection will be found in a tuberculous mesenteric or bronchial gland.

Of the two remaining portals of infection, the respiratory and alimentary mucous membranes, the latter, in surgical tuberculosis, is the more common route. It is the avenue of infection which leads to tabes mesenterica, and to tuberculous disease of the bones and joints. In tuberculosis of the cervical glands, the tubercle bacilli have entered through the mucous membrane of the mouth or naso-pharynx, or through a carious tooth. There need not be, in fact there very rarely

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is, any visible disease of the mucous membrane through which the infection has occurred.

It is an interesting fact, and one which perhaps is insufficiently appreciated, that glandular disease is the original basis of practically all forms of surgical tuberculosis. It is the primary manifestation in disease of the large glandular chains, and in bone and joint tuberculous disease of the mesenteric or bronchial glands is the primary source from which bone and joint tuberculosis has originated.

Secondary Etiological Factors.—Under this heading there is only one point to which we would allude. During the later years of the war the effect of nutrition upon the incidence of tuberculosis has been demonstrated. The statement has been questioned that during this period surgical tuberculosis has shown an incidental increase, but by a careful study of hospital statistics we have entirely satisfied ourselves that such an increase has occurred.

We believe that the imperfect nutrition from which children in common with their elders have suffered, and more especially the diminished supply of fats, has been responsible in a very large measure for the increase. We further believe that in dealing with glandular tuberculosis we have experienced a greater tendency to early caseation than formerly, and to this we ascribe a similar cause.

The Diagnosis of Tuberculosis.—Various attempts, based on Bordet's phenomenon, have been made with a view to determine whether, in tuberculosis as in syphilis, a diagnosis of the condition could be established by the complement deviation method.

The most recent investigations along this line have been published by Wang and Crocket. A special feature of the technic which they employed was the type of antigen. Previous experimenters had used preparations or extracts in some form of the tubercle bacilli. Wang and Crocket⁹ employed the bodies of the tubercle bacilli after their fatty substances had been removed, and this they secured by extraction with alcohol, ether, and chloroform.

The interpretation of this result may be summarised as follows:—In the routine method three tubes were employed: the first was a pure control, the second was a modified control containing syphilitic antigen, the third contained the tubercle antigen. A negative serum was indicated by a complete hæmolysis in the third tube (one containing the tubercle antigen) when the first control tube is clear.

A positive serum was indicated, where hæmolysis was complete in the first and second tubes, by absence or only partial hæmolysis in the third tube; the strength of the reaction being judged by the degree of hæmolysis in this differential tube.

The observers recognised that a possible source of error arose in these cases in which an inhibition of complement by a serum is

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observed in both the second and third antigen tubes. It is known that a tuberculous but otherwise normal serum may give a positive Wassermann reaction, and conversely, that a strong luetic serum may yield a reaction with a tubercle antigen. Therefore, to distinguish one reaction from the other, means had to be found by which the Wassermann reaction could be abolished. The methods previously adopted to secure this were inapplicable, because not only did they abolish the Wassermann reaction, but they also removed the greater part if not all of the tubercle antibody.

The method introduced by Wang and Crocket was as follows:—The suspected serum, whether previously inactivated or not, was mixed with an equal quantity of saline in a tube, and to each centimetre of the mixture two or three drops of chloroform were added. The tube was vigorously shaken for ten to fifteen seconds and afterwards placed in a water bath at 55° to 56° for fifteen minutes.

For use the supernatant fluid was drawn off and the test proceeded with, the original dilution with saline being allowed for. From ten to twenty minutes after the sensitised corpuscles had been added the results were read. "When less hæmolysis is observed in the tubercle antigen tube than in the syphilitic antigen one, the serum is tuberculous in addition to being luetic." "If, on the other hand, the converse is the state of hæmolysis, the probability is that the serum is only specific and not tuberculous."

The investigation embraced a series of 104 tuberculous subjects and 220 controls. The large majority of the cases were pulmonary tuberculous, but included in the series were five cases of surgical tuberculosis, four of tuberculous cervical glands, and one of tuberculous dactylitis, all of which showed a positive reaction.

From the surgical point of view it is questionable whether the test is one which will come into universal use. The technical difficulties which surround it are very considerable, and to be reliable an expert in complement deviation work is essential. In the majority of cases the diagnosis of surgical tuberculosis by clinical observation is sufficiently definite: the diagnosis of tuberculous disease of the cervical glands, for example, is rarely in doubt. In the more doubtful cases of bone and joint tuberculosis, while the complement deviation test may be useful as confirmatory evidence, it is unlikely that it will replace the method of diagnosis by the injection of a massive dose of tuberculin. This latter method has the great advantage of inducing a focal reaction. Further, as surgical tuberculosis is so commonly complicated by a superadded syphilitic infection, the complement deviation test is liable to be thereby vitiated, though this possibility of error would appear to have been avoided by the investigation methods which we have detailed.

The Treatment of Surgical Tuberculosis.—Recent interest in the

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treatment of surgical tuberculosis has centred round the question of the use of tuberculin.

Speaking generally, the consensus of opinion is agreed that in the great majority of cases of surgical tuberculosis in children operation is unnecessary. When time is no object, and suitable surroundings are available, prolonged fixation in proper appliances will cure most cases of surgical tuberculosis in bones and joints before adult life. In tuberculosis of later life the question is different, and here the majority are in agreement that early operation offers the best prospect of recovery.

Sieber¹⁰ has published an account of his experience with tuberculin in surgical tuberculosis of children. The only contra-indications which he recognises are—a temperature above 100° and disease so advanced to render any type of treatment of questionable value.

He combines the treatment with the usual hygienic and dietetic measures, and the only guide he adopts for the duration of the treatment is the complete disappearance of symptoms.

Newtown and Twinch¹¹ make out a strong case for the employment of tuberculin. They believe that even in cases where tuberculin finally loses its remedial efficiency it acts as a powerful general tonic. In the paper which they have published they adopt the useful plan of contrasting fifty cases treated with tuberculin with fifty cases which were treated by operation or on general lines without the use of tuberculin. They state that without tuberculin sixteen recovered, twenty-five died, while nine were still under treatment. With tuberculin thirty-three recovered, five were much improved, six died, and five were still under treatment.

Waterhouse¹² has lately published his experiences in the non-operative treatment of tuberculosis of the larger joints and the spine. He believes firmly in the value of tuberculin; he employs Koch's new tuberculin (T.E.), and he commences with 1/20,000 mgrm. given by subcutaneous injection; the injections are given weekly for twelve weeks, and the increase of each dose is 40 to 50 per cent. If decided reaction occurs after any dose, there should be no increase of the subsequent injection.

The opinions of these observers are an indication of a swing of the pendulum, which is at present in favour of the more general use of tuberculin as a method of treatment. There can be no question of the enormous therapeutic value of tuberculin when it is administered judiciously, but its use, if it is to be of value, requires a vast amount of care and experience. There is need for the publication of comparative papers such as those published by Newtown and Twinch, as it is from such comparisons that we are most likely to gain a fuller knowledge of the value of tuberculin.

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The Operative Treatment of Spinal Tuberculosis.—While the tendency has been to minimise the operative treatment of bone and joint tuberculosis in children, the operative treatment of spinal tuberculosis has increased in popularity. The two classes of operation have very different objects in view, for in the latter no attempt is made to eradicate the disease, but to secure what may be called an internal splintage of the bone, and so to induce by fixation of the part a more efficient natural cure. The types of operation generally performed are those associated with the names of Hibbs and Albee.

Henderson,¹³ in the most recent papers on the subject, reports eighty-one cases of Pott's disease. He claims a proportion of cures amounting to 43 per cent., and in his series there were no operation deaths.

The success of bone-grafting for spinal tuberculosis has now become definitely established, but there are certain details of the method which must be adhered to if ultimate success is to be gained. Alkalis and carbohydrates should be administered for some days previous to operation, and chloroform should not be employed as the anæsthetic of choice. These precautions are necessary owing to the frequency of an acidosis in prolonged bone operations in the case of children. With Albee's saw the time of the operation can be greatly shortened and the shock reduced. Instead of the graft being placed between the split vertebral spines, it may advantageously be laid laterally along the side of the spine. As the whole idea of the method is to induce the formation of new periosteal bone and so secure efficient internal splintage of the spine, it is most important to separate the periosteum widely from the spines, laminae, articular and transverse processes. Only by so doing can a sufficiency of new periosteal bone be formed. A spine which has been efficiently treated should at the end of six months show an appearance as though a quantity of liquid wax had been poured over the posterior surface of the spine—so profuse should be the new bone formation.

Attention must be drawn to the danger of rough handling of the spine under an anæsthetic during the operation. The support of the erector spinæ muscle is gone, and the spine may buckle or dislocate backwards if any unguarded movement is made.

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X-RAYS AND RADIUM IN GYNECOLOGICAL PRACTICE.

By JAMES YOUNG, D.S.O., M.D., F.R.C.S.

THE main interest concerning the employment of radium and radio-therapy in gynecology has centred round cancer of the uterus and fibromyomata. These forms of treatment have been employed successfully, however, in other conditions, for example chronic metritis, menarchal and climacteric hæmorrhages, endometritis, and leukoplakia vulvæ.

Considerably more experience in hospitals and clinics specially organised for the purpose is essential before their precise value can be allocated. As it is, there are only few records of series sufficiently large for any definite verdict being pronounced. Then, the indications for treatment vary greatly in different clinics, as also does the dosage and technique employed. These facts all conspire to leave the subject in an unsatisfactory position.

There is another consideration of importance. In many cases the treatment is left to the röntgenologist, who has no special knowledge of gynecology. This prevents that selection of cases suitable for ray as opposed to operative treatment. Every case should be carefully selected by the gynecologist, and throughout the treatment it should be closely supervised by him. Many cases are better treated by operation. In many, this is the only form of treatment that should be entertained for a moment. Then, in an apparently suitable case, complications may supervene during the ray treatment which necessitate surgical intervention, or the development of certain symptoms may point to the presence of a malignancy that had previously escaped detection. For these reasons it is clear that, whilst the application should be in the hands of the trained man, the case should be seen, from time to time, by the gynecological expert. The one-sided form of treatment which at present largely prevails will probably, when the results are published, tend to swing the pendulum unduly in favour of operation. Bailey¹ rightly insists on this in a paper, one of the most valuable in the recent literature.

Another point which several workers emphasise is that the man who possesses only a small amount of radium has to face problems that are different from those faced by the man who has several grams. Large doses mean short massive treatment, with rapid penetration. Small doses mean lengthy treatment, with slow penetration and a

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greater tendency to local necrosis with fistula formation in bladder and rectum.

In the following summary the subject is discussed from the point of view of the gynecologist only. The dosage and method of application is not discussed, as these problems are better left to the specialist. In this connection, however, it should be stated that there seems room for the complaint that the ray expert has not given sufficient attention to the technique as it specially applies to the female pelvic organs.

CANCER OF THE UTERUS.

X-rays alone or in conjunction with radium are employed. The chief literature concerns X-rays, which are more uniformly available and are cheaper than radium.

The most important recent paper on radium is that of Bailey.¹ Like most other workers, he employs this type of treatment (*a*) in inoperable cases; (*b*) before and after the radical operation in removable cases. He worked with small quantities of radium. The entire treatment was given over a forty-eight hour period. He believes in the routine employment of this treatment before operation. It has two effects. It kills the dividing cancer cells and it induces a productive inflammation with localised endarteritis and replacement necrosis. The first result is immediate. The second occurs after periods varying from four to eight weeks. If the surgeon will wait four weeks he will find the local lesion in the process of healing, and the cancer cells in the vicinity quiescent. There is usually no difficulty in causing an apparently complete disappearance of the tumour tissue in the cervix even when it extends to a considerable depth. The most spectacular results in his series were those of four Wertheim operations, which followed a month after the radiation. In three of these, no cancer cells were found in the uteri or parametrial tissue that were removed; and in the fourth case only a few markedly hydropic and degenerated cancer cells were present in the parametrium. If with improved technique a complete radiation of the deeper tissues could be obtained the need for operation would cease to exist, or at the worst the success of radiation would outweigh the present very doubtful success of operation. In three of the four cases above mentioned, whilst the local and superficial cure was complete, the deeper cancer was untouched. One died from recurrence, whilst two have massive involvement of their pelves that is apparently cancerous.

Bailey's series includes 325 cases of cancer of uterus in all stages. The treatment is not recommended in very advanced cases, where the maximum benefit of radiation is a slight diminution of size. Against this the contraction of tissues and the pressure on nerve endings may cause discomfort and pain greater than if the patient were left alone.

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Where the bladder and rectum are involved the radiation may hasten fistula formation by sloughing.

In cases less advanced, where the parametrium on both sides is involved, but where the cervix remains in the centre sufficiently solid as a location for the radiation, the benefit is great. The immediate advantages are marked. The hæmorrhage and discharge cease, and the end months of life are made more comfortable. There is usually a relapse within a year, and in some cases the last months may be painful due to the fibrosis.

The border-line cases are those which most properly fall into the radium field. The parametrium is involved, but indeterminately, and the vagina is overlapped. Radiation renders most of these cases operable. In his series Bailey records seven where examination of the uteri after removal showed a disappearance of cancer cells in the cervix.

Röntgentherapy in uterine cancer has a larger literature than radiumtherapy. All workers agree that it should never be considered to displace surgical removal where this is possible. It should be limited to inoperable cases, either primary or recurrent, or as a measure employed before and after operation (Provis,² Case,³ Pehler⁴). Pehler recommends eight to ten days' energetic treatment before operation, and three to five months' treatment after operation. He declares that this post-operative routine doubles the chance of success in hysterectomy.

Most observers refer to the markedly palliative effects röntgentherapy produces. It induces healing of the ulcerated surfaces in the vagina, diminishing or abolishing the hæmorrhage and fetid discharges. In addition, as the result of a direct analgesic influence, or more probably as an effect of the above changes, pain is early relieved, and until the later months it remains benefited, often very greatly.

These benefits are the greatest that are so far claimed for röntgentherapy by recent workers. The early enthusiasm with which radium and X-rays were hailed as a panacea, has given place to a more sober judgment. Whilst anything in the shape of a final cure of cancer by ray-treatment is still beyond us, it must be recognised that in this measure we have the best means yet devised to palliate the final days of suffering of a uterine cancer, unless the case is first seen only in the most advanced stages when radiation may do more harm than good. It must be held to compare favourably with the other measures which so far have held the field, *e.g.* curettage and the acetone and zinc chloride methods. Whilst radium and X-rays are only palliative in the present state of our knowledge, their recognised influence in destroying young cells opens out to us with improved technique attractive possibilities of final cure.

In the literature (Case,³ Shoop⁵) occasional reference is made to

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the occurrence of acidosis in connection with the X-ray treatment of cancer of the cervix. This is attributed to the breaking down of the masses of cancer cells with absorption in bulk. It may be associated with symptoms of fatigue, fever, nausea, vomiting, and, if the treatment is prolonged, severe anæmia. To neutralise the acidosis, Shoop recommends the administration of small doses of bicarbonate of soda.

FIBROMYOMATA OF UTERUS.

There is an extensive literature on this subject in the recent Journals.

The action of rays in inducing shrinkage and amenorrhœa in fibromyomata is recognised as a double one (1) through the ovaries, (2) by direct action on the cells of the tumour. It is still not completely established how far these relative factors operate. Experiment has proved that X-rays induce an atrophy of the ovary in the rabbit which may be very marked (Provis²). It is now recognised that X-rays have a similar action on the human generative glands. The maturing follicles of the ovary are more susceptible than the primitive follicles, which are extremely resistant, so much so that in a young woman it is said to be almost impossible to produce a permanent amenorrhœa (Frank⁶). In all cases a temporary amenorrhœa is comparatively easy to produce. It is often stated that this amenorrhœa can be induced more easily in an older woman. But recent experiments of Krönig⁷ in Freiburg suggest that the age of the patient has no influence in this connection.

The *indications* for the ray-treatment of fibroids vary in the hands of different men. Kelly⁸ is enthusiastic in praise of radium treatment as a routine, except in fibroids associated with definite contraindicating complications. He reports a total of 210 cases; 146 were patients of forty years or over. Of these 16 were not followed out and 2 died from other causes. In the remaining 128 radium caused a diminution or disappearance of the tumour, or robbed it of its clinical significance. Sixty-four patients were under forty years of age. In 28 of these the tumour disappeared entirely, in 16 it decreased. The large disappearance figure is in line with what is recognised by other observers, that the younger the patients the greater the prospect of success.

Kelly's article is the only recent report of the extensive use of radium for fibroids. Most workers are using X-rays, the indications varying in different clinics. Krönig used X-rays in 85 per cent. of his cases and claimed 100 per cent. success. Few use them nowadays so universally as this. For example, Frank⁶ states that only 5 per cent. are suitable for ray treatment. Most observers agree in recommending X-rays strongly in cases where operation is contraindicated, because of cardiac, renal, pulmonary, or other debilitating disease.

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The recognised *contraindications* to ray treatment naturally vary in different clinics with the recognised indications. All agree in condemning it in the presence of malignancy (Provis,² Kelly,⁸ Frank,⁶ Pender,⁹ Stein¹⁰). Other initial contraindications emphasised in the literature are degeneration of the tumour, submucous or subserous situation, in the latter especially if pedunculated, large size causing compression in the abdomen or incarceration in the pelvis. Disease of the appendages contraindicates ray treatment. Where menorrhagia is not arrested after three or four treatments, the diagnosis should be reconsidered (Provis²).

The incidence of sarcoma in fibroids is important in this connection. Obsessed with the figures of Klein, who stated that 77 per cent. of fibroids are sarcomatous, Stein¹⁰ condemns ray treatment except in cases where operation is clearly contraindicated. The danger of sarcoma, however, is not so great as these figures suggest. Fehling and also Martin found sarcoma in 2 per cent., Cullen in 1.2 per cent., Noble in 1.8 per cent., and Tracey in 1.5 per cent. (Eden and Lockyer¹¹). These figures thus show a maximum of 2 per cent.

The *after-effects* of the radiation of fibromyomata vary in different cases. The most prominent benefit is in regard to hæmorrhage. There may be an initial increase in hæmorrhage and patients should be warned of this. Provis points this out, and he recommends that the treatment be commenced immediately after the menstrual period, so that the beneficial action will be established before the next period. With the improved tubes and improved technique amenorrhœa can usually be quickly established, often in two months (Ledoux-Lebard¹²).

The amenorrhœa may continue permanently, due to the complete sterilisation of the ovaries. This will be especially the case in older women. On the other hand, especially in younger women, it may continue for some months, after which the menstrual flow recommences, at first irregular and then normal (Provis,² Frank,⁶ Ledoux-Lebard¹²).

From recent work it can thus be confidently stated that radium and X-rays have an important place in the treatment of fibromyomata. It is the most successful line of palliative treatment in cases where operation is contraindicated by the general condition of the patient. It is successful in controlling the most common and the most trying symptom of all—hæmorrhage. There is still room for debate as to how far this treatment should be accepted as the routine procedure in ordinary gynecological practice as against surgical removal. Certain complications demand operation without any other choice. The difficulty is in regard to the simple fibroid tumour which constitutes the bulk of these cases. In these, operation is associated with small risk, and with it permanent recovery is the rule. The observations so

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far made with ray treatment do not definitely hold out better prospects of recovery. And then it has to be still shown whether in the 1 per cent. to 2 per cent. of cases with malignant degeneration the ray treatment can be trusted sufficiently to cure the malignancy.

RAY TREATMENT IN OTHER CONDITIONS.

X-rays and radium have been recommended in gynecological conditions other than cancer and fibroids. They are especially useful in the metrorrhagias of older women in whom malignant disease is definitely excluded. Provis² strongly recommends X-rays for *chronic metritis*. He states that one can be confident of cure of the hæmorrhage in these cases after three or four applications. Frank,⁶ on the other hand, believes that operation is preferable in these cases.

There is no literature on the treatment of *appendage disease* by rays, and in the present somewhat empirical state of our knowledge of their action it may be laid down that ovarian tumours should continue to be invariably treated by operation, for it is only by removal that the actual pathology of the tumour can be discovered.

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NEW BOOKS

The Future of Medicine. By Sir JAMES MACKENZIE, F.R.S., M.D., LL.D., Ab. and Ed., F.R.C.P.L. (Hon.), Consulting Physician to the London Hospital. Pp. 238. London: Henry Frowde and Hodder & Stoughton. 1919. Price 8s. 6d. net.

The Future of Medicine is a critical review of the ideals and work of the medical profession. The increasing attention which is given to the early stages of disease with a view to prevention demands a wider outlook on the part of the medical schools. The subject becomes defined by a consideration of the work of the general practitioner. To him falls the duty of observing and interpreting all the stages of illness and disease. He, more than any other, is required to watch cases throughout their whole development, and from his continuous observations are to be obtained the data on which a complete interpretation of any disease is based. It is pointed out that the schools have been content to undertake teaching by the study of cases chiefly in the hospital wards, whereas the most difficult and at the same time the most important part of the work of the medical practitioner is that of dealing with patients before their illness is so far advanced as to require hospital treatment. The curriculum has not hitherto recognised sufficiently this aspect of medical work. How is the deficiency in the teaching to be remedied? Sir James Mackenzie shows by a wealth of illustration drawn largely from his own abundant experience how the difficulty should be solved.

The first duty of the clinical teacher is to train the student in the observation and interpretation of symptoms. The method of study set forth shows how this includes not only the diagnosis of the individual case but also forms the basis of the scientific study of disease. In the laboratories of the medical school elaborate chemical and physical methods of research are applied, and these are indispensable for certain types of inquiry: but the result of such investigation is to put the clinical observer in possession of the means of interpreting signs and symptoms which he can observe by his unaided senses or by apparatus so simple that it can be used in ordinary practice. Large fields of inquiry remain which can be investigated only by the study of symptoms, and the value of the results of all forms of medical inquiry is finally tested by their application in the interpretation of symptoms. In order to include a sufficient amount of this work in medical training, Mackenzie advocates the appointment of some general practitioners along with specialists on the teaching staff. Further, he would turn the attention

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of the school, that of teachers as well as students, to the field of observation which is offered by out-patient departments and by dispensary practice.

The aim which Mackenzie has in view is not only thorough and complete training but also the exploration of the field of general practice for the purpose of investigation.

He has demonstrated in his own experience how observations made in general practice may be the basis of investigations of fundamental importance, and he looks for similar results in the whole field of medicine.

The book expresses a new ideal. The schools have shown great vigour in the development of departments of laboratory and hospital research, but the success in that direction has tended to absorb the whole interest of the student. The schools are asked to recognise that the progress of medicine demands a clearer recognition of the essential part which clinical observation plays in the scientific investigation and treatment of illness.

There is at the present time a general effort in the medical schools of the country to increase the efficiency of their teaching. Mackenzie, by defining the part to be taken by clinical study and its bearing on the group of special sciences which are included in the curriculum, has given a new outlook on the whole problem.

Menders of the Maimed. The anatomical and physiological principles underlying the treatment of injuries to Muscles, Nerves, Bones, and Joints. By ARTHUR KEITH, M.D., F.R.C.S., F.R.S. Pp. xii. + 335. With Illustrations, 16 Portraits, and 7 Figures. London: Henry Frowde and Hodder & Stoughton. 1919. Price 16s. net.

The war has called forth many excellent books dealing with different forms of surgical treatment found necessary for our wounded soldiers. Most of these are practical treatises concerned chiefly with detail, and before long they are likely to be out of date. The book before us, however, is of a different kind, and we welcome it as one likely to remain of great value for many years to come. Although largely biographical in character as its title indicates, the real purpose of the book is to expound "the principles which underlie the art of orthopædic surgery." The idea is a happy one, and its fulfilment is admirable. Professor Keith is not engaged in surgical practice, but he has been a thoughtful observer in general practice and is evidently the friend of many surgeons. He has an intimate knowledge of anatomy, physiology, and pathology, and treats the subjects under discussion from the standpoint of a philosopher. The biographical part of the book adds much interest to the portions dealing with

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science. A series of epoch-making men who have revealed Nature's secrets to succeeding generations are brought vividly before us by pen and pencil illustration. The curtain is lifted, and we see such men as John Hunter, Hilton, Owen Thomas, Marshall Hall, Duchenne, Syme, Goodsir, Ollier, Lucas-Championnière, Redfern, and many others busily occupied in research. We learn where and how they worked, what contemporary knowledge of science and what instruments for research were at their disposal, what their early struggles in life were, what difficulties they overcame, and what opposition they had to meet before their discoveries were appreciated.

The information presented to the reader must have entailed diligent search in many quarters, but the author has thereby added much value to his book, and afforded material for many valuable lessons for future students.

The subject-matter is divided into twenty chapters, which deal among others with the following subjects: the relative value of rest and of movement in the treatment of diseased and injured joints, bones, and muscles; the part which reflex nervous influence plays in developing symptoms, inducing complications, and affording clues for diagnosis and treatment; the laws of degeneration and regeneration in injured nerves; the field of usefulness of massage for injured muscles and joints; the mode of growth of bone and the relation of its structure to the function demanded of it; the behaviour of cartilage under pathological conditions, and, in closing, a judicial estimate of the practices of bone-setters, ancient and modern. A theme which permeates the whole book is the dependence of the surgeon on the natural laws of healing, and the need for his knowing and using these in his practice. In several instances Professor Keith shows how an advance in knowledge has led to the solution of certain questions once greatly disputed—for instance, how the battles royal which were formerly fought over the functions of the periosteum are now set at rest, or should be, by a knowledge of the reproductive properties of bone corpuscles.

In most cases the conclusions arrived at are likely to be generally accepted, but with one we do not agree. The author seems at one place to favour operative treatment for simple fractures for reasons that would not hold good if Lucas-Championnière's methods were better known. In more than one place he refers to the Report of the British Medical Committee on Fractures as if the conclusions therein arrived at are to be taken as final. A study of the material contained in that report, however, would show that the evidence for the best method of non-operative treatment—as laid down by Lucas-Championnière—was not before the committee at all. There was no definite group of cases so treated available for comparison either with

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the new operative treatment or with the old and mischievous non-operative treatment by prolonged immobilisation.

Professor Keith writes in a most interesting way and does full justice to his subject by the charm of his manner of presenting it.

We cordially commend this book to medical students and graduates alike. They will all receive from it instruction and inspiration, and much food for thought.

Report of a Committee of Enquiry regarding the Prevalence of Pellagra among Turkish Prisoners of War. By Col. F. D. BOYD, Consulting Physician, E.E.F., and Lt.-Col. P. S. LELEAN, Assistant Professor of Hygiene, R.A.M. College. Pp. 65. With numerous charts and graphs.

This report embodies the results of an inquiry into the prevalence of pellagra among Turkish prisoners in 1918 in Egypt. The authors had the assistance of a pathologist, bacteriologist, physiologist, protozoologist, hæmatologist, and biochemist, so that the investigation was undertaken from many standpoints. Several interesting results were obtained. The disease affecting the prisoners was found to be true pellagra with all the ordinary skin, alimentary, and nervous symptoms. Most of the cases were pellagrous before capture, and on capture on one occasion in a group of 1300 prisoners 18 per cent. suffered from the disease. There was no evidence to show that one case was infected from another in the camp. The disease occurred only in Ottoman troops and not among German prisoners in an adjacent camp. The investigators found no evidence that any bacterium, protozoon, or blood condition were ætiological factors. They reject the maize theory and find no evidence to support Sambon's "fly" theory. Their statistics show an association between the biological protein value of the diet and the occurrence of pellagra. They bring forward evidence to show that lack of sufficient biological value of protein acts as an exciting and possibly as a determining factor in the production of the disease. The authors are to be congratulated both on the thorough way in which the investigation was carried out and the lucid manner in which the results are expressed.

On Gunshot Injuries to the Blood-vessels. By George Henry Makins, G.C.M.G., C.B. Pp. 251. With 64 Illustrations. Bristol: John Wright & Sons, Ltd. 1919. Price 21s. net.

We welcome this monograph by Sir George Makins on a subject to which he has devoted so much attention and on which he is a recognised authority. The book is almost entirely based on his personal experience. No attempt has been made to deal with the

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literature of the subject, but, by presenting the detailed results of his own observations, the author has added to, rather than detracted from, the value of this important contribution to surgical literature.

Chapters are devoted to the distribution and anatomical characters of gunshot wounds of the vessels, to the symptoms and signs of injury of large blood-vessels and the treatment of hæmorrhage, and to the effects of occlusion of the main vessels on the vitality of the tissues. Arterial and arterio-venous hæmatomata and traumatic aneurisms are discussed in all their aspects. Separate chapters are devoted to the general principles of surgical treatment and to the special features of injuries of the main vessels of the trunk and extremities. The plates and figures, which are of a high standard throughout, illustrate both the microscopical and gross pathology of injuries of blood-vessels as well as their clinical and anatomical features.

Further experience has confirmed the author's opinion that, when the main artery of a limb is ligated, gangrene is less liable to follow if the associated vein is ligated at the same time. Statistics are quoted in support of this statement. While Cassel's method of vascular suture is ideal for wounded vessels the damage to the vessel wall is frequently so extensive that ligation is necessary. Suture should be confined to cases in which there is a reasonable prospect of maintaining asepsis and, as far as possible, to wounds of an incised type. Extensive injuries can occasionally be treated satisfactorily by resection and end-to-end suture, but if there is any tension the vessel is almost certain to be occluded by a thrombus. The most promising arteries for end-to-end suture are the carotid, brachial, and superficial femoral. The author states that the needles need not be so fine as those used for experimental work. The use of Tuffier's tubes is described, and cases are quoted in which the tube remained patent sufficiently long to permit the collateral circulation to be established and to prevent gangrene, which would almost certainly have followed immediate ligation. In the space available it is impossible to refer to many of the important and interesting facts described by the author. As a scientific and practical exposition of the subject the book will recommend itself to all who are interested in the surgery of the blood-vessels.

Handbook of Anæsthetics. By J. STUART ROSS, M.B., F.R.C.S.
Pp. 214, with 54 illustrations. Edinburgh: E. & S. Livingstone.
1919. Price 7s. 6d. net.

In the short compass of two hundred pages Dr Stuart Ross furnishes a most complete and practical exposition of the science and art of anæsthetics. We emphasise the word "science" because we

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have here presented an exceptionally lucid and instructive explanation of the rationale of the action of anæsthetics, based on physiological principles.

The art of anæsthetic administration is no less ably described, and the description is obviously based on long and careful observation and experiment. The author's deductions and directions are eminently practical, and while he shows no bias in favour of one anæsthetic over another, he leaves no doubt in the reader's mind as to his own preferences. Is the vaporising method of administering ethyl-chloride not wrongly ascribed? We have always associated it with the name of Dr J. H. Gibbs. Special attention is paid to the combination of nitrous oxide and oxygen, which, for certain purposes, has proved in the hands of the author and his colleagues in the Edinburgh school, of great value.

In an introduction, Professor Alexis Thomson rightly lays stress on the advantage to the patient of having an expert anæsthetist acting in association with the surgeon in serious operations.

The chapters on local and spinal anæsthesia contributed by Mr W. Q. Wood, and on Intratracheal Anæsthesia by Dr H. Torrance Thomson, are on the same high level as the author's share.

We can confidently recommend this work to our readers as an eminently practical and scientific presentment of the modern position of the whole subject of anæsthesia.

Fractured Femurs. By M. G. PEARSON, O.B.E., M.B., B.Sc., F.R.C.S., and J. DRUMMOND, M.D., M.R.C.P.(Edin.) Pp. 92, with 50 illustrations. London: Henry Frowde and Hodder & Stoughton. 1919. Price 10s. 6d. net.

The authors, who have had exceptional opportunities of gaining experience of their subject while in charge of the special femur wards at the First South African General Hospital and at the Edmonton Surgical Hospital, here set forth the details of the technique which they have evolved and found to be the most efficacious.

A brief history is first given of the treatment of fractures of the femur during the war. Two short chapters are devoted to the surgical anatomy of fractures of the femur and to the early operative treatment of gunshot wounds of the thigh. The subsequent chapters deal with the mechanical principles of treatment, the nursing of femur cases and with the results obtained.

The authors are in complete accord with those who laud the Thomas splint. They are of the opinion that the Liston splint should be altogether abandoned. Stress is laid upon the necessity of suspending the ring of the Thomas splint, a procedure which prevents the ring from slipping over the tuber ischii.

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They emphasise the value of traction applied directly to the distal bone fragment, and for this purpose have devised a modification of the Besley's caliper which does not penetrate the bone. When traction is so applied the ligaments of the knee are not stretched. Further, the leg is then suspended in a "knee flexion piece" attached to the bars of the Thomas splint, which allows of early mobilisation of the knee joint.

A frame bed with a sectional mattress is also described, which facilitates dressing and nursing.

The illustrations are numerous and excellent, and the text clear and concise. The book will undoubtedly prove of value to those in charge of fractured femur cases not only in military but in civil practice.

Atlas of Operative Gynecology. By BARTON COOKE HIRST, M.D., University of Pennsylvania. Pp. 292, with 210 illustrations. Philadelphia and London: J. B. Lippincott Company. 1919. Price 30s. net.

This atlas represents an attempt to convey the teaching of the technique of the more common gynecological operations by the graphic method. The operations described are illustrated by a series of fine coloured plates with just sufficient letterpress to explain them fully, and make them comprehensible to students who have had no previous experience.

A preliminary to the operative work is an interesting description of the author's new clinic from the architectural point of view, with plans of the theatre, labour room, anæsthetising room, and all the accessory accommodation. This is followed by sections on operating tables, instruments, and on methods of preparing the patient.

The drawing and reproduction of the plates are admirable, and the only criticism that we have to offer upon this feature of the book is that some of the plates are unnecessarily complicated, and show too many threads and forceps. The representation of the foetus in Plate CLX. (Cæsarean Section) is more like a doll than a human baby.

The plates and the text illustrate the particular methods employed by Professor Hirst. These appear to differ in several minor points from the technique more commonly followed on this side of the Atlantic, and to differ in the direction of greater complexity. The plates will therefore quite naturally be of most value to the author's own students. At the same time the underlying principles and the main steps of the operations are common to all operators and schools, and in respect of these the volume will no doubt prove useful as an adjunct to the teaching of practical gynecology.

NOTES ON BOOKS

THE outstanding features of the *Medical Annual* for 1919 (John Wright & Sons, 20s. net) are naturally the latest developments of those branches of surgery and medicine concerned with military practice. The contributors of the articles bearing on these matters have taken great pains to summarise all that has been accomplished up to the present date, and with conspicuous success. Other branches have been dealt with with equal ability, and we can confidently recommend this issue of the *Annual* as an admirable summary of last year's advances in all departments of practical medicine.

Practical Therapeutics, by H. Amory Hare (Henry Kimpton, 1919, 28s. net). The new (seventeenth) edition of this standard work has been re-written and arranged so as to constitute a mirror of present-day therapy. It is an admirable didactic treatise, and the reader cannot fail to find many useful hints on treatment as well as ample discussion of the actions and comparative merits of drugs. It is interesting to note the author's belief in digitalis as a drug which raises blood pressure—a view shared by the reviewer—and his opinion that the withdrawal of sodium chloride when bromides are given in epilepsy is of dubious justification. A few errors have escaped correction in the proofs, notable on p. 413, where the word "incapable" ought manifestly to read "capable." The subject-matter of the volume is the outcome of a ripe clinical experience and sound knowledge and judgment. Attention may be directed specially to the chapters describing the clinical features of the various drug habits, for the luminous method in which the author has handled them.

Pathological Technique, by F. B. Mallory and J. H. Wright, seventh edition (W. B. Saunders Company, 1918, 17s. net). The section on histological methods in this practical manual is admirably complete. A brief description of the particular tissue constituent under consideration is first given, next various staining methods found useful for its demonstration, and lastly an account of its appearance when stained by each method. A very large number of staining procedures are described, and histologists will find this section a valuable one. To the section on bacteriological technique it is not possible to give such unqualified praise. The chapter on culture media is conspicuously inadequate in a book which deals solely with technique. Only standard media are described; there is practically no allusion to recent advances in the science of media making, especially in the standardising of hydrogen-ion concentration, and little reference is made to those small practical difficulties which, though rarely mentioned in text-books, are so frequently the cause of failure in this all-important branch of

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bacteriology. In the general bacteriological section a few special media are described, and there is a fairly useful description of the methods of identifying the chief pathogenic bacteria and fungi. Here the authors' excellence in staining methods leads them rather to over-emphasise the importance of this branch of technique as applied to bacteriological diagnosis. A small section is devoted to "clinical pathology," a term used by the authors to exclude both bacteriology and histology, another small section to the technique of post-mortem examinations, and a curious and rather illuminating finishing touch is put to the book by the inclusion of the preparation of bacterial vaccines in the addenda along with a method for blackening table-tops and other incongruous details.

The Blind: Their Condition and the Work being done for Them in the United States, by Harry Best, Ph.D. (The Macmillan Company, 1919, \$4.00), is a very valuable book containing a vast amount of information from many sources, and its contents should appeal not only to those with a sentimental yet intelligent and practical interest in the welfare of the blind, but also to those who, regarding the subject rather from the social and economic point of view, are concentrating their attention on the prevention of blindness and on the provision of education and suitable employment for those already blind.

Though the author deals primarily with the problem of the blind as it affects the United States of America, and though his statistics, his medico-legal facts regarding the status of the blind, and his criticisms and suggestions regarding the existing institutions for their education and training, apply strictly to the United States, yet his facts and suggestions throw a great deal of light on the problem as it affects every country with a social system organised on similar lines.

The book deals very fully with such questions as the prevention of blindness, the education of the blind, including the provision of literature, also with the great question of material provision for the blind, this including a very full account of workshops for the blind and very instructive tables regarding their earning capacity.

A very full account is also given of public and private organisations interested in the blind.

The statistics regarding blindness are drawn from American census tables, and although these contain much that is of value they are obviously very imperfect, especially perhaps with regard to the causation of blindness, the entry in the census table under this heading being apparently simply the statement made by the blind person or his friends.

Our American cousins have resolved to do everything possible to prevent blindness, as well as to alleviate the lot of those already blind.

Blindness arising in infancy from ophthalmia neonatorum is a

Notes on Books

reproach to civilisation, and the Americans have determined that a thoroughly strenuous effort must be made to dry up this cause of blindness at its source. In the industrial world the question of how to protect the eyes of workmen in dangerous trades is now being more seriously considered, and in the future one would expect a steady if gradual decline in the percentage of serious injuries to workmen.

On the whole question of the condition of the blind the author expresses himself with force and eloquence, but he is never swayed by false sentiment when discussing the measures that should be taken to train and educate the blind and to provide them with suitable employment.

Mr Best rightly insists that the blind who are physically and mentally fit should work, but he points out clearly how very few among them can take their place in the labour world with any hope of maintaining themselves in reasonable comfort. He has a great deal to say about the best methods of providing the necessary pecuniary assistance.

This book should be in the hands of everyone who, officially or unofficially, is specially interested in this social problem.

A Text-Book of General Bacteriology, by E. O. Jordan (W. B. Saunders Company, 1918, 17s. net). In the sixth edition of this well-known American text-book various changes have been made in accordance with recent additions to our knowledge. The chapter on the pneumococcus has been of necessity rewritten in consequence of the research work on this group of organisms carried out chiefly at the Rockefeller Institute. That on the meningococcus has also been considerably altered; while other diseases attributable more or less completely to war conditions have demanded fresh additions. The book takes a wider outlook on bacteriology than do most text-books on the subject, and the chapters on the bacterial diseases of plants, on bacteria in the arts and industries, and on other subjects outside the bacteriology of diseases affecting human beings, have a particular interest and value. Descriptions of technique have been as far as possible omitted, so that it is in no sense a practical manual, but as a text-book of general bacteriology it can be recommended. There is a moderately full bibliography.

The Ophthalmoscope, by Gustavus Hartridge, F.R.C.S., Sixth Edition (J. & A. Churchill, 1919, 6s. 6d. net). The fact that this little manual is in its sixth edition shows that it is of value to those who are beginning the study of the ophthalmoscope. No mention is made of the electric ophthalmoscope, which now bids fair to supersede the older method of direct examination. The book would be improved if Plates 3, 4, and 5, illustrating fundus disease, were produced in colour and made to have more resemblance to the actual appearances.

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Some Questions of Phonetic Theory: The Perception of Sound, by Wilfrid Perrett (W. Heffer & Sons, Ltd., 1919, 2s.). The controversy still goes on between those who believe in the peripheral analysis of tones, *i.e.* Helmholtz's resonance, or "piano" theory of hearing, and those who hold to the theory of central analysis, best remembered by Edinburgh students as Rutherford's "telephone" theory. Lately we had an extremely interesting and scientific book by Sir Thomas Wrightson and Professor Arthur Keith, entitled *An Inquiry into the Analytical Mechanism of the Internal Ear*, in support of the latter view. The present work is intended by the writer to demolish Helmholtz's theory, but it cannot be said to carry any great weight. The general tone may be gathered from the following quotation: "The parrot, with only half a whorl to its cochlea, where there are two and a half whorls in the human ear, and without any fibres, arches, pillars, rods, poles or perches of Corti, is able to imitate speech and whistle musical notes; while the guinea-pig, with no less than four whorls and a magnificent organ of Corti, such that one might imagine its possessor capable of turning out a complete sonata before breakfast, is never heard to produce anything more beautiful than squeaks or grunts." From other passages one might gather that the book belonged to the Anti-German War Propaganda, though believers in the resonance theory are by no means confined to Germany. The conclusion come to by the author on the subject of resonance in the internal ear is that "there is no resonance in the internal ear."

BOOKS RECEIVED.

BAINBRIDGE, F. A.	The Physiology of Muscular Exercise	(Longmans, Green & Co.)	10s. 6d.
BARTON, GEORGE EDWARD.	Teaching the Sick	(W. B. Saunders Co., Ltd.)	8s. 6d.
BAYLY, HUGH WANSEY.	Venereal Disease	(J. & A. Churchill)	10s. 6d.
BOX, CHAS. R.	Post-Mortem Manual. Second Edition.	(J. & A. Churchill)	8s. 6d.
BRERETON, F. S.	The Great War and the R.A.M.C.	(Constable & Co.)	12s. 6d.
BROWN, W. LANGDON.	Physiological Principles in Treatment. Fourth Edition	(Baillière, Tindall & Cox)	7s. 6d.
BURNET, JAMES.	Manual of Diseases of Children. Second Edition.	(E. & S. Livingstone)	—
CALEB, C. C.	Practical Physiological Chemistry	(Butterworth & Co. (India) Ltd.)	Rs. 8.
CARTER, HERBERT H.	Diet Lists of the Presbyterian Hospital, New York City. Second Edition	(W. B. Saunders Co.)	6s.
COOKE, ARTHUR.	Groundwork of Surgery	(W. Heffer & Sons, Ltd.)	7s. 6d.
DAVIS, JOHN STAIGE.	Plastic Surgery	(Henry Kimpton)	42s.

Books Received

DIXON, S. GURNEY-. The Transmutation of Bacteria	(Cambridge University Press)	10s.
DORLAND, W. A. N. American Pocket Medical Dictionary. Eleventh Edition	(W. B. Saunders Co., Ltd.)	7s. 6d.
DUNTON, W. R. Reconstruction Therapy	(W. B. Saunders Co.)	6s. 6d.
EDEN, THOMAS WATTS. A Manual of Midwifery. Fifth Edition	(J. & A. Churchill)	24s.
EWING, JAMES. Neo-Plastic Diseases	(W. B. Saunders Co., Ltd.)	42s.
FERGUSON, R. BRUCE. Aids to the Mathematics of Hygiene. Fifth Edition	(Baillière, Tindall & Cox)	3s. 6d.
FLAGG, PALUEL J. The Art of Anæsthesia. Second Edition	(J. B. Lippincott Co.)	18s.
FRIEDENWALD, JULIUS, and JOHN RÜHRAN. Diet in Health and Disease. Fifth Edition	(W. B. Saunders Co., Ltd.)	25s.
GARDINER, FREDERICK. Handbook of Skin Diseases (E. & S. Livingstone)	—	—
HARRIS, WILFRED. Electrical Treatment. Third Edition	(Cassell & Co., Ltd.)	9s.
HEINEMANN, PAUL G. Milk	(A. B. Saunders Co., Ltd.)	25s.
HERTZLER, ARTHUR E. The Peritoneum. 2 Vols	(Henry Kimpton)	50s.
HOFFMANN, ERICH. Die Behandlung der Haut- und Geschlechts-krankheiten. Second Edition	(Marcus & Webers Verlag)	M. 5.60
KNOX, ROBERT. Radiography and Radio-Therapeutics. Part II	(A. & C. Black)	18s.
LOEPER, M. Leçons de Pathologie Digestive. Fourth Series	(Masson et Cie.)	F. 11
MACEWEN, JOHN A. C. Fractures, Compound Fractures, Dislocations and their Treatment	(Maclehose, Jackson & Co.)	12s. 6d.
M'FARLAND, JOSEPH. Pathogenic Bacteria and Protozoa. Ninth Edition	(W. B. Saunders Co., Ltd.)	21s.
M'VAIL, J. C. Half a Century of Smallpox and Vaccination	(E. & S. Livingstone)	5s. 6d.
MAYO CLINIC PAPERS, 1918. Vol. X.	(W. B. Saunders Co., Ltd.)	36s.
POTTENGER, F. M. Symptoms of Visceral Disease	(Henry Kimpton)	21s.
PYE'S Elementary Bandaging and Surgical Dressing. Fourteenth Edition	(John Wright & Sons, Ltd.)	3s. 6d.
ROSS, JOHN STUART. Handbook of Anæsthetics	(E. & S. Livingstone)	7s. 6d.
SMITH, J. GILBERT. An Outline of Genito-Urinary Surgery	(W. B. Saunders Co., Ltd.)	12s. 6d.
STARLING, ERNEST H. The Feeding of Nations	(Longmans, Green & Co.)	5s.
WALKER, JAMES. Medical Organic Chemistry. Second Edition	(Gurney & Jackson)	10s. 6d.
WALLACE, J. SIM. Child Welfare	(Baillière, Tindall & Cox)	5s.
WHIPPLE, GEORGE CHANDLER. Child Welfare	(Chapman & Hall)	18s. 6d.
WHITLA, Sir WILLIAM. A Dictionary of Treatment. Sixth Edition	(Baillière, Tindall & Cox)	25s.
WILLIAMS, GWYNNE. Minor Surgery and Bandaging. Seventeenth Edition	(J. & A. Churchill)	10s. 6d.
WOOD, W. Q. A Text-book of Surgery	(James Galloway)	—

Edinburgh Medical Journal

February 1920

EDITORIAL NOTES

By the death of Mr C.-E. Green this Journal, and indeed the medical profession as a whole, have lost a very sincere and trusty friend. Mr Green's sympathy with medical men and their work did not arise from the circumstance that he had created a great medical publishing house; it dated back to the time when he himself was studying medicine, and when his aim in life was to become a medical missionary. To his great disappointment, however, family reasons compelled him to give up medicine and, while still a youth, to take over his father's business. Once entered upon his new career publishing seized upon his imagination, and no scheme in the way of book production seemed too large to be ventured on and carried through with success. The numerous encyclopædias of law, medicine, and accounting, the rows of English and Scottish Law reports, and the medical, legal, and scientific monographs which issued from his press and publishing office were a great and lasting source of pride to Green. His relations with authors and contributors were of the happiest description. Written agreements were almost unknown, bargains were mostly verbal, for everyone knew that Green's word was his bond.

The nature of cancer was a subject in which Green took a great deal of interest, and he devoted a large amount of time to a painstaking statistical inquiry into some of its aspects. His papers, some of which appeared in this journal, attracted considerable notice at the time.

Mr Green's relation to the Journal was always most cordial; he was very reluctant to sever his connection with it, and solicitous that the change should be made without detriment to its prosperity. From first to last the Journal has found in him a loyal well-wisher, and his unexpected death, after a brief illness, is a very real and personal loss to many who have been brought into contact with him in the course of their literary work.

Editorial Notes

A GENERAL COMMITTEE is being formed to promote the scheme for establishing a Research Institute in Edinburgh as a memorial to the late Lord Lister. The Principal of the University and the Presidents of the two Royal Colleges have issued an invitation to members of the medical profession and others to join this committee, from which we quote the following paragraphs:—

“Shortly before the outbreak of war steps were taken to initiate the establishment in Edinburgh of a permanent Memorial to the late Lord Lister. It is strongly felt that such a Memorial is required, not only to perpetuate his memory, but to promote the scientific spirit which animated him and the methods of research which he developed. These have been of untold value to humanity. As it was in Edinburgh that his system was elaborated and consolidated, it is more than appropriate that a Memorial should find its place there, especially in view of the feelings which were expressed by himself in a letter to the late Principal Sir William Turner, dated 27th July 1907.

“The University, the Royal College of Physicians and the Royal College of Surgeons of Edinburgh have come to the conclusion that the most suitable form for such a Memorial would be an Institute where the scientific investigation of disease in any of its forms could be undertaken, and in which the principal Sciences concerned could be adequately taught. They have therefore decided to co-operate in this movement for the establishment in Edinburgh of such an Institute, and before the war they had entered into a formal agreement providing for its administration.

“While the war has delayed the progress of the Scheme, it has given a new and emphatic proof of the supreme importance to humanity of Lister’s great discoveries.

“Since July 1914 an extensive and extremely suitable site has been secured close to the Edinburgh Royal Infirmary and the Medical School of the University, at a cost of over £50,000.

“To pay for the site, and erect and equip the necessary buildings, and provide for maintenance, apart from remuneration to research workers, a sum of at least £250,000 will be required.

“As an earnest of the depth of their feeling in the matter, the University and the Royal Colleges in 1913 agreed to contribute sums amounting to £25,000.

“In order to meet the larger portion of the cost, an Appeal to the public is necessary. For this purpose it has been decided to form a General Committee.

“The Right Hon. A. J. Balfour, M.P., Chancellor of the University, has consented to act as Honorary President, and His Grace the Duke

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of Atholl, the Earl of Rosebery, Admiral of the Fleet Earl Beatty, Lord Glenconner, Lord Leverhulme, and Sir J. Lorne MacLeod as Honorary Vice-Presidents."

THE Medical Correspondent of the *Morning Post** has done good service in appealing to the National Council for **The Campaign against Venereal Diseases.** Combating Venereal Disease and the Society for the Prevention of Venereal Disease to sink their differences, which are not fundamental but only in matters of detail, and to speak to the public with one voice: The two bodies are on the whole so generally in agreement, the views that they hold in common are so many and so far reaching, that it seems almost impish perversity for a matter of abstract ethics which (with all deference, be it said) every one has prejudged, and which cannot be settled by argument, to keep the two bodies apart and lessen, as it inevitably will, the influence they exert on the public. Both societies insist on continence as the only real safeguard against infection, and place measures for the encouragement of chastity in the forefront of their propaganda. Both societies, too, realise that man is frail, and that the evils of promiscuous intercourse can and ought to be lessened by disinfection at the earliest possible moment. But the National Council holds that disinfection is only permissible after intercourse, and refuses to countenance prophylactic disinfection, which the Society for Prevention advocates.

The protagonists of both parties have argued the case from two (as it seems to us, quite irrelevant) points of view: first, as to the relative efficacy of disinfection before and after coitus, and, secondly, from the moral standpoint. Needless to say, neither has converted the other. It is probably at the present time impossible to adduce scientific proof of the relative merits of one or other procedure, and a protest may be entered against medical statistics being called as a scientific witness in the trial of a moral question, for it is essentially the moral aspect which, as a matter of conscience, keeps the two bodies apart. Nobody has a right to expect the disavowal of sincerely held convictions, but surely it is better to assert in public the nine tenths of agreement than to flaunt the one-tenth of difference. In Scotland we have had enough experience of sectarian controversy to speak feelingly on such disputes — the furious contests over a single diphthong which the profane of every age have derided. Whether a prophylactic packet is a good thing or a bad is probably less important, even from a hygienic point of view, than the ill-effects of the disunion between two bodies whose ultimate aim and object is one and the same.

* 13th February 1920

Editorial Notes

LIEUT.-COL. JOHN KEAY, R.A.M.C. (T.F.), and MAJOR JAMES W. B. HODSDON, R.A.M.C. (T.F.), have been
Honours. awarded the C.B.E. (Military) for services in connection with the War.

THE University Court have made the following appointments:—
Appointments. Mr G. M. Robertson, M.D., F.R.C.P., to be the first holder of the newly-instituted Professorship of Psychiatry in the University of Edinburgh; Mr J. H. Ashworth, D.Sc., F.R.S., to be the first holder of the newly-instituted Professorship of Zoology in the University of Edinburgh. With the concurrence of the Corporation of the City of Edinburgh, Mr David Lees, M.B., F.R.C.S., to be Lecturer on Venereal Diseases; Mr F. E. Jardine, M.B., F.R.C.S., to be Lecturer on Applied Anatomy for the current academical year.

Mr R. Charles Alexander has been appointed Assistant-Surgeon to the Chalmers Hospital; and Miss G. Hertzfeld, Assistant-Surgeon to the Royal Hospital for Sick Children.

MR ARTHUR ROBINSON, M.D., F.R.C.S.Ed., Professor of Anatomy, The University, Edinburgh, will deliver the
Sir John Struthers Struthers Lecture in the Hall of the Royal
Lectureship. College of Surgeons of Edinburgh, in the month of December 1920. Subject—"Antenatal Death."

AT the Graduation Ceremonial, held in the M'Ewan Hall, on 19th December 1919, the Vice-Chancellor conferred the following Degrees in Medicine:—

**University of
Edinburgh
Graduation
Ceremonial.**

The Degree of Doctor of Medicine.—Charles Edward Blair, Ireland, M.B., Ch.B., 1905; Alexander Bremner, Scotland, M.B., Ch.B., 1913; William Francis Christie, Scotland, M.B., Ch.B., 1909 (Major, R.A.M.C.), (*Commended for Thesis*); Mary Olivia Fergusson, Scotland, M.B., Ch.B., 1915; Joseph Geoghegan, Scotland, M.B., Ch.B., 1911 (Capt., R.A.M.C.); David Alexander Ross Haddon, Scotland, M.B., Ch.B., 1913; Sydney Herbert Hall, England, M.B., C.M., 1894; Archer Hosking, New Zealand, M.B., C.M., 1896 (*Commended for Thesis*); Spencer Jackson, England, M.B., Ch.B., 1907; William Prideaux Selby Johnson, England, M.B., Ch.B., 1908; James Henry Kerr, Scotland, M.B., Ch.B., 1917; Muriel Hamilton Kerr, Canada, M.B., Ch.B., 1915; Wilfrid M'Farlane, Scotland, M.B., Ch.B., 1902; William Keverall M'Intyre, Tasmania, M.B., Ch.B., 1915 (*Commended for Thesis*); Daniel M'Kelvey (M.C.), Ireland, M.B., Ch.B., 1913 (Capt., R.A.M.C.); Robert Morison, Scotland, M.B., Ch.B.,

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1902 (*Commended for Thesis*); William Tyrrell Patterson, Scotland, M.B., Ch.B., 1915; Kerr Simpson, Scotland, M.B., Ch.B., 1909 (Capt., R.A.M.C.), (*Commended for Thesis*); Francis Hugh Stewart, (M.A., B.Sc.), Scotland, M.B., Ch.B., 1904 (A/Lt.-Col., I.M.S.), (*Highly Commended for Thesis*).

The Degrees of Bachelor of Medicine and Bachelor of Surgery.—Ahmed Fahmi Abbassi, Egypt; George Sandwith Bainbridge, England; Leonard van Renen Becker, South Africa; Gladys Annie Adeline Boyd (M.A.), Scotland; James Godfrey Lyon Brown, Scotland; Donald Arthur Cadman, Scotland; Margaret Steele Caskie, Scotland; Norman Henry Gustave Cloete, South Africa; Alexander Younger Peattie Cochrane (M.A.), Scotland; Walter Hugh Critien, Malta; Dorothy Grace Davidson (M.A.), Scotland; Andrew Weir Davison, Scotland (*First Class Honours*): Herbert Joseph Alexander Dingwall, British Guiana; Henry Reginald Dodson, Scotland; Norman M'Omish Dott, Scotland; Evelyn Winifred Annie Dunderdale, England; Alexander Ralph Erskine, Scotland; Millicent Fox (B.A., Syd.), Australia; Gurdial Singh Gill, India; Alice Marian Graham, Scotland; James Alphonsus Hennessy, New Zealand; William Augustine Hennessy, New Zealand; Ralph Allan Sarjeant Hoyte, British West Indies; Alexander Joe, Scotland; Reginald Noel Johnson, South Africa; Jacob Idzinga Kuit, South Africa; John Learmont (M.A.), Scotland; Arnold Roland M'Lean, British West Indies; Jane Stewart M'Phail, Scotland; William Malcolm MacPhail, Scotland; Alexander Murray MacRae, Scotland; Douglas Alexander Miller, Scotland (*Second Class Honours*); Luiz Edmond Miller, South Africa; Helen Morison, Scotland; Georgina Isabella Blair Nichol, Scotland; Emmanuel George Hamilton Payne, British Guiana; Donald Rankin, Scotland; Edowo Awunor Renner, West Africa; William Beattie Ross, Scotland; Janet Craig Rugg, Scotland; Muriel Sellers, England; Arnold Hoseason Shennan, Scotland; Alexander Macdonald Simson, Scotland; Shem Stein, South Africa; Hugh William Young Taylor (M.A., B.Sc.), Scotland; Thomas Robert Rushton Todd, Scotland; Vera Cecil Veitch, Scotland; George Richard Simon Walles, Ceylon; David Tweedy Watt, Scotland.

The Diploma in Tropical Medicine and Hygiene was awarded to Francis George Macnaughton, M.B., Ch.B.

The *Whiteside Bruce Bursary* was awarded to Robert Boyd Edmund.

At a meeting of the College held on 16th January, the following gentlemen having passed the requisite examinations were admitted Fellows:—Joseph Ringland Anderson, M.B., B.S. Melbourne; Maurice Holdsworth Barton, M.R.C.S. Eng., L.R.C.P. Lond.; Christopher Osmond

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Bodman, M.R.C.S. Eng., L.R.C.P. Lond., M.B., B.S., M.D.; Gavin Stiell Brown, M.B., Ch.B. Edin.; Arthur Harold Budler, M.B., Ch.B. Edin.; Andrew Campbell, M.B., Ch.B. Edin.; Norman Stuart Carruthers, M.R.C.S. Eng., L.R.C.P. Lond.; Percy John Chissell, M.R.C.S. Eng., L.R.C.P. Lond.; Frederick Crooks, M.B., B.Ch. Belfast, M.Ch.; Walter Crosse, L.R.C.S.E. (Triple) (Capt., A.A.M.C., A.I.F.); Alfred Beuthin Danby, M.R.C.S. Eng., L.R.C.P. Lond.; William Everett, M.B., Ch.B. Edin.; Arthur Horace Gibson, M.B., B.S. Melbourne (Lt.-Col., A.A.M.C.); Harold Reginald Wessen Husbands, M.R.C.S. Eng., L.R.C.P. Lond.; Karam Chand Jaidka, M.R.C.S. Eng., L.R.C.P. Lond.; Harold Victor Lamb, M.R.C.S. Eng., L.R.C.P. Lond. (Capt., R.A.M.C.); James Breadalbane M'Diarmid, M.B., Ch.B. Aberd.; George M'Mullan, M.B., Ch.B., M.D. Edin.; William Martin, L.R.C.S.E. (Triple); Leonard May, M.B., Ch.M. Sydney; Vincent Philip Norman, L.M.S.S.A. (Lieut., I.M.S.); Courtenay Henry Gerard Pochin, M.R.C.S. Eng., L.R.C.P. Lond.; William Sowerby, M.B., Ch.B., M.D. New Zealand; Geoffrey Sparrow (M.C.), M.R.C.S. Eng., L.R.C.P. Lond., M.B., B.C. Cantab.; David Campbell Suttie, M.B., Ch.B. Glasg.; Mordaunt Graham Sutton, M.B., C.M. Sydney (Capt., A.A.M.C.); Rustom Navroji Vakil, M.R.C.S. Eng., L.R.C.P. Lond., M.B., B.S. Lond.; Dallas Bradlaugh Walker, M.B., Ch.B. New Zeal.; Neville Graham Sutton, M.B., C.M. Sydney (Capt., A.A.M.C.).

HYPERTONUS OF THE SYMPATHETIC IN RELATION TO INTESTINAL TOXÆMIA.*

By J. J. GRAHAM BROWN, M.D., F.R.C.P.E., Consulting Physician,
Royal Infirmary of Edinburgh.

INTESTINAL toxæmia is so frequently present in the human subject, and its effects are so various, so widespread, and so serious, that the problem it presents as regards diagnosis and treatment demands careful consideration on the part of the physician.

In its causation, many varieties of micro-organisms take part, each producing toxins which, absorbed by the blood-stream, give rise to special symptoms. These are in some instances sufficiently characteristic to be of diagnostic value as indicating more or less exactly the variety of toxin which is acting. The bacteriological examination of the intestinal excreta is, of course, of a high importance; but, as regards diagnosis, a yet greater importance appears to me to attach to the definite clinical recognition of the special tissues upon which the toxin is acting and from which the signs of toxæmia arise.

Most, though not all, of the signs and symptoms of intestinal toxæmia develop as the result of toxic action on the neurones of the autonomic or involuntary nervous system. The two great divisions of that system—the sympathetic and the para-sympathetic—may each suffer, the incidence depending upon the particular variety of toxin which is acting. Moreover, the symptoms which result from disturbance of these two groups of neurones differ as materially as do their functions. For the sympathetic and para-sympathetic systems are diametrically opposed in function the one to the other, much as the lights and shades of a photographic positive differ from those of the negative of which it is a print.

The observations on which this paper is founded deal exclusively with the results of such toxic action as affects the sympathetic system proper and not the para-sympathetic. Moreover, of the toxins which do so act, the effects on the human subject of one only will be considered, namely, those of para-hydroxy-phenyl-ethylamine, probably the most powerful

* A communication read before the Edinburgh Pathological Club, July 1919.

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of the Amines which select the sympathetic neurones for attack.

The underlying condition which tends to produce putrefactive changes, with consequent intestinal toxæmia, is delay in the passage of material through the gastro-intestinal tract. This abnormal delay is usually most marked in the lower coils of the ileum, and the resulting ileal stasis favours the infection of the contents with pathogenic organisms. The greater the stasis the more intense will be the putrefactive changes and the more considerable the production of toxins. Some further observations on this subject will be made subsequently. In the meantime let us consider certain of the digestive processes which normally occur in the human intestine, especially those in the ileum.

In the course of normal metabolic activities, the proteins are hydrolysed into amino-acids. Various digestive enzymes take part in this process, which is completed by the erepsin of the succus entericus. These amino-acids are carried by the blood to the liver, where they are de-aminated, the resulting ammonia being excreted as urea, and the fatty acids being used as energy producers.

A serious modification of this process occurs in cases of intestinal stasis, for in many persons with this condition these amino acids are attacked by pathogenic organisms, with the result that various amines are formed which are more or less toxic.* The bacteria which thus act are anaerobes, or at least facultative anaerobes, and the Amines so formed fall into two groups, mon-amines and di-amines. The di-amines, of which the very dangerous β -iminazoly-ethylamine² may be taken as a type, are depressors, but with these we are not at present concerned.

The group of mon-amines, on the other hand, have a pressor action, and so closely do their activities resemble the results of stimulation of the sympathetic neurones that they have been called "sympatho-mimetic amines."³ We are concerned now with the action on the human subject of but one of these, namely para-hydroxy-phenyl-ethylamine.†

This toxic amine is derived from tyrosine, one of the amino-acids, and is formed, chiefly in the lower ileum, by the action of faecal bacteria under anaerobic conditions. It is conveyed

* This subject is fully discussed by Barger.¹

† A phosphate salt of this base is sold under the registered trade name of "Tyramine."

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to the liver by the blood-stream, there to be converted into *p*-hydroxy-phenyl-acetic acid, and in this form it is ultimately excreted in the urine. The pressor action of this Amine is considered to be about $\frac{1}{20}$ of that of adrenaline.

A special interest attaches to *p*-hydroxy-phenyl-ethylamine, since in many patients in whom signs of hypertonus of the

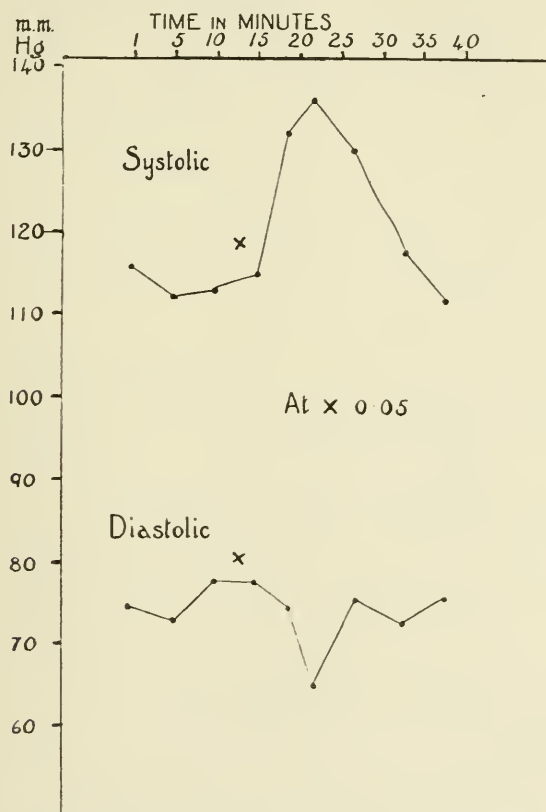


FIG. 1.—Changes in Systolic and Diastolic Blood-pressure.

sympathetic show themselves, this is the causative agent.* Certainly, in suitable cases of intestinal toxæmia we can detect its presence in the urine, and we can observe its clinical signs with fair accuracy.

Certain of these effects have been already investigated. It is well known, for example, that this Amine, when administered

* It is not, of course, contended that in such cases other pressor amines, having a similar though much less potent action, may not also be at work.

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hypodermically in doses of 20 to 60 mg., raises the blood-pressure very considerably.[†] The height of the rise is usually reached in ten or twelve minutes, and its duration is about twenty-five minutes. As one would expect, this increase of systolic pressure is specially well-marked in persons who already show some sympathetic hypertonus. For example, in a case of this kind—a boy of 17—we observed the blood-pressure to rise to nearly 200 mm. as the result of a comparatively small dose of the Amine, 0.03 g.

Hewlett, in his observations,[†] notes that the diastolic pressure also rises. This I have not found to be invariably the case. On the contrary, in certain persons at any rate, a diastolic fall takes place coincident with the systolic rise. These reactions are illustrated in Fig. 1, the pressures being charted from the records obtained in the case of a healthy man of 40, the readings being taken just before and after the subcutaneous administration of a dose of 0.05 g.*

The cause of the rise in systolic pressure produced by this Amine is not fully clear. No doubt it is mainly due to a contraction of the peripheral arterioles such as follows sympathetic stimulation, possibly also to constriction of the capillaries. There are, however, other factors at work, and to one of these allusion will be made subsequently.

Coincident with the rise in the systolic pressure there is a marked fall in the rate of the pulse. This is illustrated in Fig. 2. Such a fall is what we should expect to result from so sudden a rise of blood-pressure. It is the expression of one of the most important protective-reflexes of the body. The receptors (proprio-ceptive) lie in the arch of the aorta and in the cardiac wall. Their adequate stimulus consists in the stretching of the tissues in which they lie, and when that stretching occurs (as must take place when the blood-pressure rises), an impulse passes by the afferent neurones of the depressor nerve of de Cyon† to the vagus centre in the medulla (probably to the nucleus intercalatus), and is thence reflected down the vagal inhibitory neurones, the result of this

* The Amine itself is insoluble in water, and in all the observations here recorded I made use of the acid phosphate of the base which is freely soluble. The readings of blood-pressure were taken by the auscultatory method, the Tycos sphygmomanometer being used.

† In man and in most mammals these neurones do not run as a separate nerve, but are mixed with vagal fibres.

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stimulus being to slow the beat of the heart. To the action of this reflex may also be ascribed the fall in diastolic pressure, which I have observed and which has been illustrated in Fig. 1.

If now, in a case of chronic ileal stasis and intestinal toxæmia, this pressor toxine, *p*-hydroxy-phenyl-ethylamine, has been formed continuously, though perhaps in small quantity, and as continuously absorbed, it is clear that the patient must have been exposed to the effects of a blood-pressure constantly above normal. The results which we know are apt to follow any sustained high pressure are those we should expect to meet with in such a patient.

Prominent among these are arterio-sclerosis and chronic

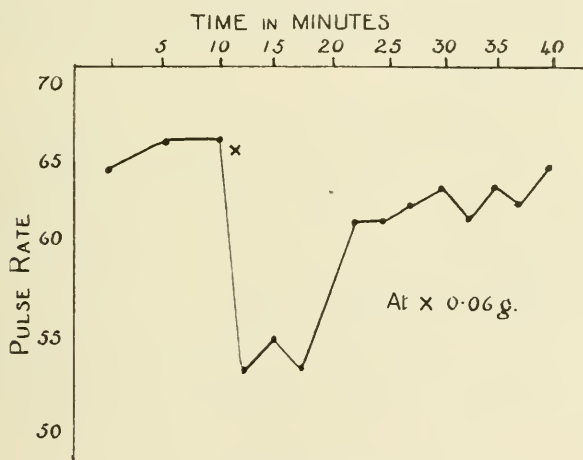


FIG. 2.—Fall in Pulse-rate.

interstitial nephritis, and it is important to remember that just these very changes are capable of being produced by the pressor Amine, the actions of which we are now studying. The experiments of Harvey⁵ are clear on this point. He gave the Amine to rabbits sometimes intravenously, sometimes by the mouth, in small doses, the treatment lasting for many weeks. The first pathological changes resulting from the action of the Amine showed themselves in the aorta. A general arterio-sclerosis followed, and finally nephritis developed.

It has been asserted by some that arterio-sclerosis and interstitial nephritis are frequently produced by prolonged hyper-adrenalism. The very careful and elaborate work of

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Elliot⁶ appears to me to be sufficient to disprove this hypothesis. Such conditions are much more likely to be due to the slow but continuous pressor action of such an Amine as the one we are now considering.* Indeed, there cannot be any doubt that arterio-sclerosis, chronic nephritis, and rheumatoid arthritis may one and all result from intestinal toxæmia, and that the lines of treatment which I shall indicate as suitable for cases of poisoning by para-hydroxy-phenyl-ethylamine are more or less applicable to these disorders also.

In view of what has been said, we must now consider how we are to correlate the phenomena of hypertonicity of the sympathetic with the effects of the Amine.

As regards the rise in blood-pressure which follows the action of the Amine, there is no difficulty, for the pressure tends to be high in cases in which there is over-stimulation of the sympathetic neurones.

The change in the pulse-rate, however, presents a problem of some complexity. On the one hand, as has been seen, the rate is materially lowered after the administration of the Amine. On the other hand, the rate is high in cases of sympathetic hypertonus, sometimes very high when the condition passes into that of Graves' disease—a syndrome which has been well described as that of "crystallised fear."

But in this connection, in facing this problem, various factors have to be taken into account. It must be remembered that in normal subjects on whom these observations were made, the dose of the Amine administered was comparatively very large, that it was suddenly thrown into the circulation, and that it was evidently destroyed quickly in the tissues, the maximum effect passing off with rapidity. In marked contrast to this stand the conditions under which hypertonicity of the sympathetic neurones is usually developed. Here we must think of a slow, steady, continuous, but minute toxic action on neurones already, it may be, weak in resisting power (either hereditarily or from some other cause) and therefore hypersensitive and easily attacked, the action lasting, in many cases, for months or years.

Moreover, in such a case, although this Amine may be the underlying cause of the symptoms, it is not the only cause; for over-stimulation of the sympathetic tends to hyperthyroidism as well as to hyperadrenalism, the condition going on often enough to actual Graves' disease. In the observations here recorded,

* Apart, that is, from syphilis, the most potent cause of all.

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the action of the Amine was probably too evanescent to produce evident effect on the thyroid.

In view of such considerations, it seemed desirable to determine what the clinical effects of the Amine would be were it administered to patients already suffering from hypertonus of the sympathetic.

The curves in Fig. 3 represent the results obtained in such a case. This patient, a girl of 20, was under observation for some considerable time. The X-ray screen and photograph revealed the presence of ileal stasis, and she showed evident signs of hypertonicity of the sympathetic, the threshold for sugar, for

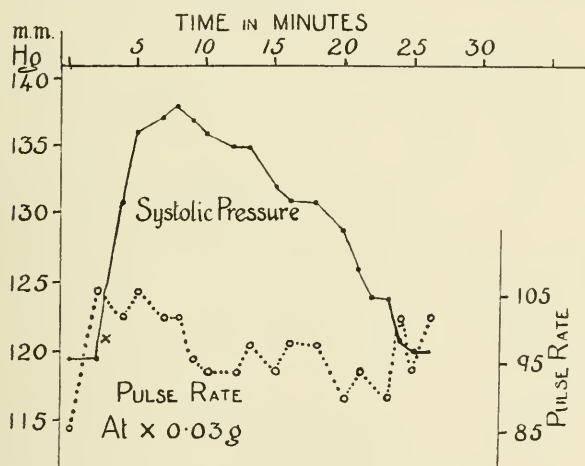


FIG. 3.

example, being distinctly lowered, and adrenaline glycosuria being readily produced. It will be observed, on looking at the curve of pulse-rate, that the cardiac action was so easily excited that the mere adjustment of the sphygmomanometer armlet was enough to raise the rate considerably before the injection was made.

The important point brought out by these curves is that although the rise in blood-pressure following the action of the Amine was as considerable as usual, the pulse-rate hardly fell at all. It is reasonable to assume that this was the result of a hypertonicity of the accelerator neurones (sympathetic in their origin), sufficient to overpower the para-sympathetic depressor neurones. This assumption is the more reasonable, as we know

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that these accelerator stimuli are unduly high in cases such as that from which these curves were taken.

Another and more striking instance of the same kind is recorded in Fig. 4. Here it will be noted that the pulse-rate, instead of falling under the influence of the Amine, on the contrary rose considerably, reaching a rate of over 110 beats per minute.

We may thus conceive that the clinical action of the Amine, in small but continuous absorption over long periods, as in a case of intestinal toxæmia, would be as follows. Hypertonus of the sympathetic would result, rendering these neurones more susceptible to those stimuli—fright, etc.—to which they normally

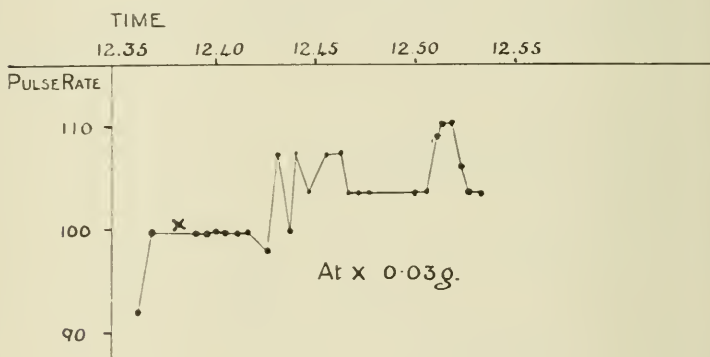


FIG. 4.

react, and to which, in such a case, they would react in quite abnormal measure.

There would then occur a certain rise of blood-pressure and an increase in the pulse-rate. The adrenal glands would be stimulated, the thyroid also, for its innervation is entirely sympathetic.⁷ Moreover, increased thyroid activity would in its turn stimulate the secretion of adrenaline.⁸ Indeed, as Cramer has pointed out, "hyperthyroidism is in effect a slight but continuous adrenalism," a conclusion which is confirmed by clinical evidence.

These, as I conceive, are the processes, the links in the chain, by which the slow but continuous absorption of *p*-hydroxy-phenyl-ethylamine over long periods of time leads to hypertonicity of the sympathetic, and in certain cases even to the striking phenomena of Graves' disease.

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But bradycardia and high blood-pressure are not the only phenomena which follow the subcutaneous injection of para-hydroxy-phenyl-ethylamine in the human subject.

When we examined the blood before and after the subcutaneous injection of this Amine, various notable changes were found to have resulted from the action of the toxine.

In the first place, the red blood-count rises very materially, sometimes to 8,000,000 or even above that figure. The chart in Fig. 4 is from a subject where the rise was a more moderate one.

In this increase we find another resemblance between the results of the action of the Amine and that of adrenaline. But

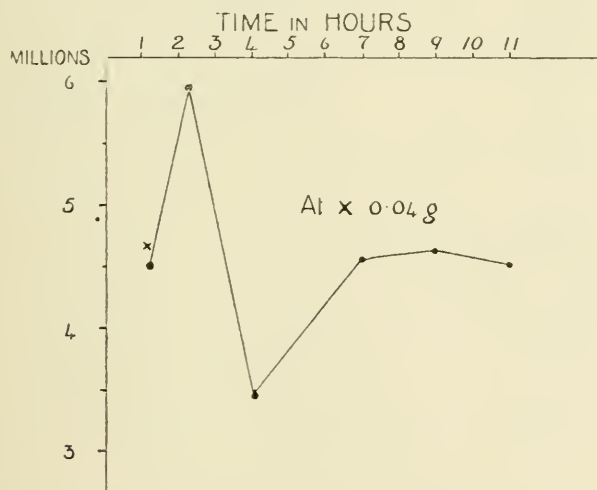


FIG. 5.—Effect on the Red Count.

there are other blood changes, for the leucocyte count also rises, sometimes more or less in proportion to the rise in the reds, sometimes out of all proportion.

This increase, which we found in both red and white cells in the blood-count, suggested the possibility that for some reason plasma had been lost with consequent concentration of the blood, the number of both reds and whites being thus apparently increased.

This assumption may be dismissed as untenable. One reason is that if we follow the analogy of the polycythæmia of adrenaline we reach a widely different conclusion. For animal experiment has shown that adrenaline in causing a great increase

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in the red count, does so by acting on the liver from which red blood-cells are poured out. This adrenaline-polycythæmia does not occur if the hepatic artery is previously ligatured.⁹ As has been already said, the Amine is changed in the liver into the acetic acid compound, and this is, to my mind, distinctly suggestive in this connection.

But there is another and a yet stronger reason for holding that the increase of both red and white blood-cells is not due merely to the abstraction of plasma and a consequent concentration of the blood.

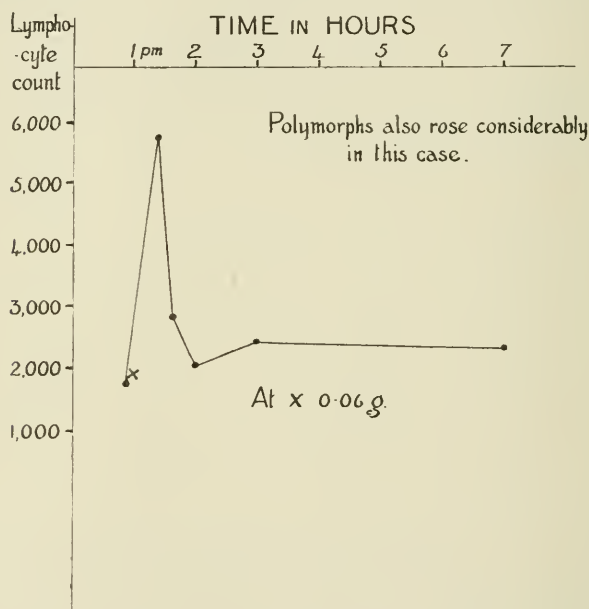


FIG. 6.—Effect on Lymphocyte Count.

When the blood-picture was more carefully examined and when a differential leucocyte count was carried out, a curious change was found to have occurred. The great rise in the numbers of white cells, to which reference has just been made, was discovered to be due mainly to an increase of lymphocytes.* The result of such a differential count is seen in Fig. 6.

* The polymorphs were sometimes diminished, sometimes increased, but in every instance, so far as I have been able to determine, the lymphocyte increase is very considerable. The large and the small lymphocytes are both increased, the latter rather more than the former.

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Here again we find another similarity between the results of the action of *p*-hydroxy-phenyl-ethylamine and the phenomena of sympathetic hypertonus, for in the latter condition the lymphocyte count is usually increased, sometimes very considerably. Therefore we are getting exactly what we would expect, on the assumption that the sympathetic is stimulated by the action of the Amine.

It is also exceedingly interesting to note how closely the blood-picture after the subcutaneous injection of adrenaline resembles that obtained after the administration of the Amine.¹⁰ For the purpose of comparison the curve of lymphocyte counts before and after the subcutaneous injection of adrenaline (1 c.c. of a 1:1000 solution) are given in Fig. 7.

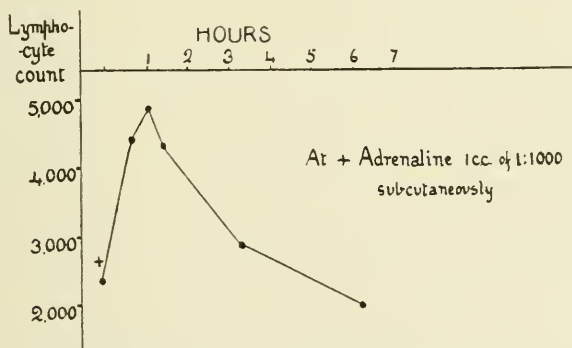


FIG. 7.—Adrenaline Lymphocytosis.

All the specimens of blood which furnished the data referred to above were taken from the lobe of the ear, and it seemed to me just possible, though very unlikely, that the changes found in the blood-picture were present only in the blood at the extreme periphery of the body. To test this, two specimens of blood were taken simultaneously, one from the ear, the other from a vein in the arm, in each case both before and after the administration of the Amine. No material difference could be detected between the blood-picture presented by the peripheral and by the venous blood. The same observation was made in connection with adrenaline, with a similar result.

In referring to the great increase of blood-pressure following the action of the Amine, I indicated that besides the factors then mentioned there was yet another. It seems obvious that

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the considerable increase in blood-cells which occurs must in some measure increase the peripheral resistance and thus help to raise the pressure, though this factor is probably not of great importance.

An attempt has been made in the previous pages to show how closely the results of the action of *p*-hydroxy-phenyl-ethylamine in healthy persons resemble the clinical features of a case of hypertonus of the sympathetic nervous system, and that, in certain cases, this Amine is the underlying cause of such symptoms. It is to be clearly understood, however, that many other toxines derived from bacterial action in the alimentary canal may and probably do have a similar though less potent action.

Obviously, therefore, before initiating treatment, a correct diagnosis must be reached and the form of toxæmia present accurately determined. It is, at any rate, clear that certain of the usual signs of sympathetic hypertonus would show themselves, though it would be only in exceptional cases that the full clinical picture would be developed. What are these signs?

Apart from cases which have gone on to actual Graves' disease, the subject of sympathetic hypertonus will present some at least of the following, which are among the main characteristics of that condition. Spare of build, light of weight, generally of fair complexion, with refined and mobile features, eyes rather prominent and pupils large, the patient will be nervous in manner, with heightened reflexes and some tremor, especially of the eyelids.* The action of the heart will be easily accelerated by any excitement such as that of examination. The blood-picture will show few, if any, eosinophiles, there will be a rather high mono-nuclear count, and the blood-pressure will be above normal. As regards metabolism, the threshold for sugar will be lowered and glycosuria may follow the diagnostic administration of adrenaline. The secretion of gastric juice will be scanty with consequent hypochlorhydria, and X-ray examination will usually reveal atony of the gastric wall, some tonicidity of the sphincters, slow passage of bismuth and ileal stasis.

In a case presenting symptoms of this kind, though, as has been said, the clinical picture may not be complete, the next

* Differing therefore materially from the sufferer from chronic constipation, with his pasty face, with his greasy skin, and with his languid mental and bodily activities.

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step towards an accurate knowledge of the variety of toxæmia present consists in the examination of the urine. After tyrosine has been converted into *p*-hydroxy-phenyl-ethylamine by pathogenic bacterial action, chiefly in the ileum, the Amine, absorbed into the blood-stream, passes to the liver, and is there, in turn, converted into *p*-hydroxy-phenyl-acetic acid. In this form it is excreted in the urine.

Its detection there is not difficult. I used the method recommended by Mutch,¹¹ which is as follows:—Of the urine (diluted if necessary to specific gravity of 1015), 50 c.c. is taken, and to this 5 c.c. of a 25 per cent. sulphuric acid is added. Extract with 15 c.c. of ether. The ether is then evaporated, and 2 c.c. of distilled water and a similar quantity of Millon's reagent added. This is repeatedly boiled and allowed to stand. According to the amount of the Amine present, the fluid becomes rose-red, dark red, or even a deep mahogany brown. It is to be noted that normal urine gives a red reaction with Millon, but the substances which so act are insoluble in ether.

If this reaction is obtained, it may safely be concluded that the case is one of intestinal toxæmia, and that *p*-hydroxy-phenyl-ethylamine is acting selectively on the sympathetic neurones.

Obviously the problem which the physician must now face and if possible solve, is how to limit the formation and absorption of the Amine, or, in other words, how to check intestinal putrefaction.

It is not proposed to discuss here those surgical measures, the advisability of which it may be the duty of the physician to consider in severe cases. These measures have undoubtedly proved successful in highly skilled hands and in certain cases. What we are here concerned with are those remedial measures which lie within the province of medicine proper. Various considerations must guide us, and to these attention must now be directed.

The first of these is the question of diet.* What variety of food is most favourable to the production of these toxins? The amino-acids, from which they are formed by bacterial activity, result from the action of various gastro-intestinal enzymes on the protein molecule. Clearly, therefore, proteins should be excluded from the diet as far as is reasonably possible.

* As regards this subject, see paper by H. H. Mitchell, "The Influence of Protein Feeding on the Concentration of Amino-acids, etc." *Journal of Biological Chemistry*, 36 (1918), p. 501.

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Farinaceous foods, milk, butter, fruit, and vegetables, are more suitable, and should, in the main, form the diet in these cases.

When the sympathetic is in a condition of hypertonicity, such as intestinal toxæmia may occasion, certain definite effects on the gastro-intestinal tract are produced. The general result is to cause contraction of the sphincters and relaxation of the wall of the stomach¹² and intestine generally. It is said that a similar effect is produced on the wall of the œsophagus and on the sphincter at the cardiac orifice, but this I have not been able to observe. In any case, the gastric dilatation and the comparative atony of the intestinal wall, together with the spasm of the pylorus and of the ileocolic sphincter,¹³ are factors of high importance, leading to marked retardation in the passage onwards of the gastro-intestinal contents.

In so far as the absorption of toxins is concerned, the considerations of most importance are the state of the stomach, of the lower coils of the ileum, and of the colon. The delay in the stomach may be of considerable duration, and the opportunity for decomposition of its contents thus presented is further enhanced by reason of the deficiency in the secretion of gastric juice which sympathetic hypertonus produces. The inhibiting action of hydrochloric acid on fermentative changes which normally occurs is thus much diminished.

But the ileal stasis which results from atony of the gut with spasm of the ileo-colic sphincter is yet more important, leading as it does to further delay in the atonic colon, which itself tends to become overloaded.

To ensure a more rapid passage of the contents of the bowel, laxatives are usually required, and along with these the administration of paraffin is very useful. In addition to its lubricating action, it probably limits the absorption of toxins by the intestinal wall, as Leonard Williams has pointed out. I have occasionally used physostigmine salicylate with benefit as an aperient in minute doses. Theoretically, its action in causing peristalsis and thus antagonising the effect of sympathetic stimulation, would indicate its employment.

A much more important line of treatment, however, consists in the use of such measures as are calculated to limit bacterial putrefaction and the consequent formation of the Amine. This may be accomplished more or less effectively in two ways—by the administration of intestinal antiseptics, and by the use of a carefully prepared autogenous vaccine.

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Of the former, Thymol, which is probably the most effective, has long been known as a potent remedy for this purpose. It was, so far as I know, first used as an intestinal antiseptic by Kuessner, in 1878,¹⁴ then by Bozzolo¹⁵ of Turin in 1881. Of late its employment has been recommended by M'Carrison¹⁶ in cases of endemic and other forms of goitre. I have given it in many cases, in doses of five to ten grains, twice daily and with good results. In one or two instances some gastric discomfort followed, but as a rule it is well borne. Great care must be taken to avoid the use of such solvents as glycerine, fats, oils, and alcohol during the period of the administration of Thymol. For this reason it is best to place the patient under observation in a nursing home.

The following notes of a case, very briefly given, may serve to illustrate the usefulness of this remedy.

CASE I.—T. R., a man of 30, came under observation last March. His pulse-rate was then rapid, 108-112, the blood-picture showed a high lymphocyte count, there was muscular tremor, the eyes were prominent and the pupils dilated. There were, in short, certain of the signs of hypertonus of the sympathetic. On examination with X-rays after a Bi-meal, ileal stasis showed itself and the colon was relaxed and overloaded. A specimen of the twenty-four hours' urine examined on 20th March by Mutch's method gave a dark mahogany colour with Miillon's reagent, showing that *p*-hydroxy-phenyl-acetic acid was present in large quantity. The Amine was therefore being absorbed and was causing toxæmia. In addition to this, the urine gave the tests for urobilin in a marked degree, the amylic acid solution showing a brilliant green fluorescence and giving with the spectroscope a deep absorption-band up to the line *b*. Probably the presence of urobilin indicated that intestinal toxins were disturbing the hepatic functions, as well as causing hypertonus of the sympathetic.

On the same day—the 20th of March—this patient was put under the influence of Thymol, 10 grains being given twice a day. Four days later, the urine gave no indication of the presence of the Amine, though urobilin was still detectable in small quantity. By the 31st no trace of either substance could be found. The pulse-rate had then fallen to 78-82 and the general condition of the patient was satisfactory.

Short notes of another case also suffering from the toxic action of the Amine, and with more prominent sympathetic symptoms, may be given.

CASE II.—Mrs K. S. was sent to me some months ago. She was then complaining of distressing palpitation, emaciation, and weakness.

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Her nervousness was unusually great for such a case, and the muscular tremor very marked. The eyes were prominent and the pupils dilated. The pulse-rate was from 96 to 108. Ileal stasis was present. She was given Thymol, at first in 5-grain doses; a week later the dose was raised to 10 grains, twice daily. At the end of three weeks of such treatment it was noted that there was marked general improvement, that the nervous excitability which had been extreme was now so much abated as not to be noticeable. The tremor, though slight, was still present, the eyeballs were less prominent, and the pulse-rate had fallen to 84-90.

Of other intestinal antiseptics, I prefer grey powder in small doses and β -naphthol. These may be given alone or together. Acetyl-methyl-salicylate* along with ichthalbin, I used to find an excellent combination, but the former of these is now difficult or impossible to procure. Other intestinal antiseptics may be employed, such as salol, salicylate of quinine, carbolic acid, various mercurial preparations and ichthoform. The last named seems sometimes to cause gastric irritation. I have seen benefit follow the use of yadil, given by the mouth and also used in colon lavage.

The second method which may be employed for limiting the activity of pathogenic intestinal organisms is by means of a vaccine. This should invariably be autogenous, and be prepared from the fæces. Bertelot¹⁷ was, I think, the first to isolate the organisms which have the power of breaking up amino-acids—*Bacillus aminophilus intestinalis*. This bacillus, which belongs to the typhoid-coli group, has the power under suitable conditions, of breaking up tyrosine in the manner already described and producing *p*-hydroxy-phenyl-ethylamine. It is a facultative anaerobe, and consequently the vaccine must be prepared from anaerobic cultures.

In some cases, though not in all, a vaccine so prepared gives excellent results. The following case, in which the clinical evidences of the toxic action of the Amine were conspicuous, may serve as an example.

CASE III.—L. B., a girl of 21, came for advice on account of nervousness, palpitation, weakness, and vague abdominal symptoms. She stated that she had lost weight to a considerable extent, her manner was restless, she was easily excited, and her face had an anxious expression. She flushed easily and there was marked tremor of hands and eyelids. Her eyes were rather prominent, but there was

* Known also as salacetol.

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no goitre though the thyroid was perhaps a little full. The pupils gave Lowi's reaction with adrenaline. She complained of palpitation and there was a degree of tachycardia, the rate of the pulse being 100-108. The systolic blood-pressure was 138, and the blood-picture showed that a considerable lymphocytosis was present. The administration of 100 grains of glucose caused marked glycosuria, and a subcutaneous injection of adrenaline had a similar though slighter result.

The abdominal discomfort hardly amounted to pain and appeared to be the result of the obstinate constipation from which she suffered.

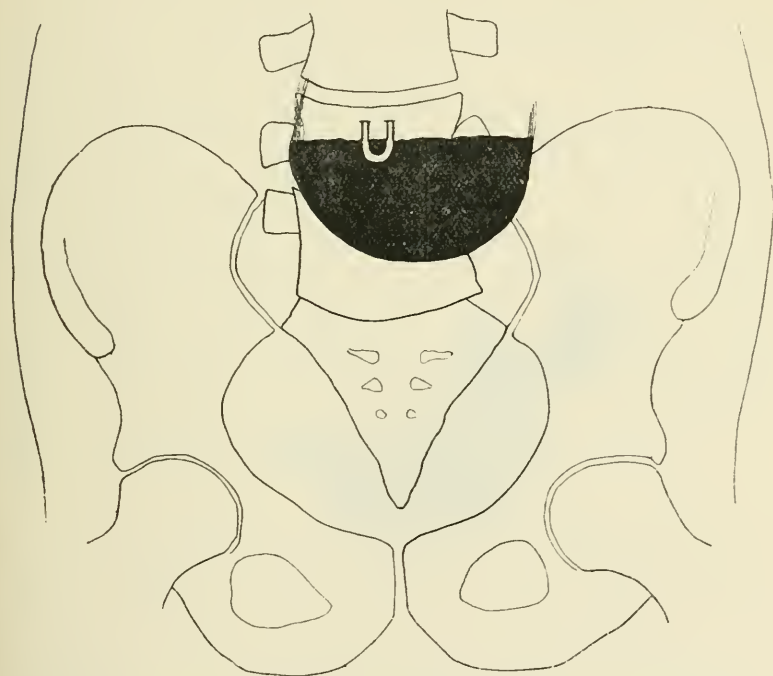


FIG. 8.—Reduced tracing from X-ray Plate taken immediately after Bi-meal.

The stomach contents contained very little free or combined HCl, and an X-ray examination of the abdomen after a bismuth meal showed atony of the stomach (see Fig. 8) and marked ileal stasis, with signs of spasm of the ileo-colic sphincter (see Fig. 9) and considerable delay in the passage onwards of the gastro-intestinal contents.

Two months later, after treatment with β -Naphthol and then with Thymol, it was found that considerable improvement had taken place in her condition. But, nevertheless, things were not wholly satisfactory, for the patient was still unduly excitable, there was still some

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tremor, and the lymphocyte count was still high. It was therefore decided to try the effect of a vaccine to be obtained from the fæces. Dr Wang, in the laboratory of the Royal College of Physicians, kindly undertook to carry through the necessary anaerobic cultures and to prepare the vaccine.

During the weeks which followed, the patient received increasing doses of this vaccine at intervals of six or seven days, and after about two months of this treatment she was again examined carefully. It

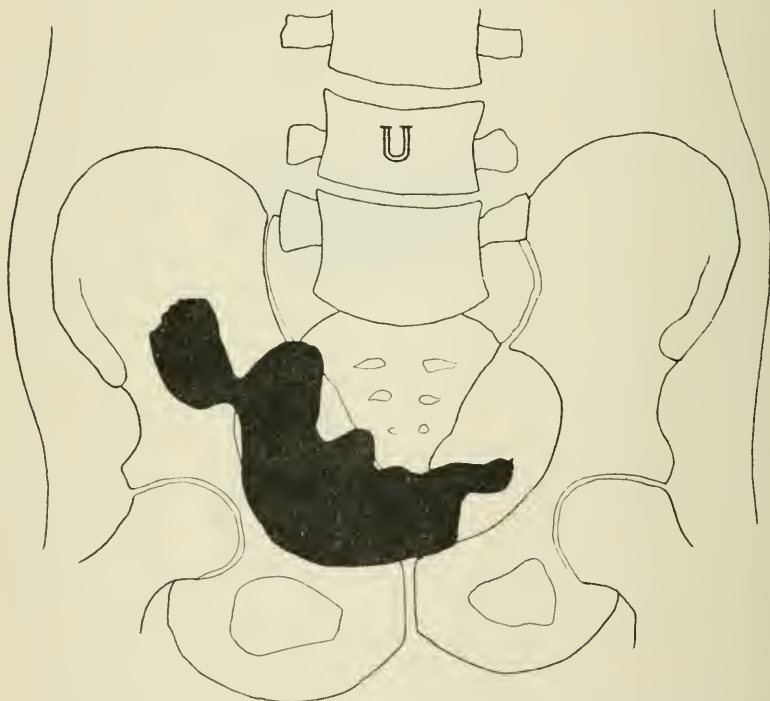


FIG. 9.—Reduced tracing from X-ray Plate taken six hours after Bi-meal.

was then noted that she had gained weight, that the tremor had disappeared, that the cardiac action was now quiet, the pulse-rate being about 80, and that she had no palpitation or other symptom, though some increase of lymphocytes was still present. The patient declared that she felt "perfectly well."

An attempt has been made in these pages and by means of the observations here recorded, to indicate certain, at any rate, of the actions on the human subject of the pressor amine derived

Hypertonus in Intestinal Toxæmia

by bacterial action from tyrosine, namely *p*-hydroxy-phenyl-ethylamine.

The older observations regarding the increase of blood-pressure and the coincident bradycardia have, in the main, been confirmed.

In addition to these facts, it has been found that certain profound changes in the blood-picture result from the action of the Amine. These consist chiefly in a great increase in the number of red cells and in a very marked lymphocytosis.

The striking similarity between the results of the action of the Amine and the symptoms of hypertonicity of the sympathetic and consequently of hyperadrenalism has been pointed out.

It has further been shown that in many cases of sympathetic hypertonicity the toxic action of the Amine may not only be inferred but also that its presence may be actually demonstrated and the diagnosis established.

Various methods of treatment of this form of intestinal toxæmia have been discussed, and cases illustrative of the results have been given in some detail.

No attempt has been made in this paper to deal with other forms of intestinal toxæmia which arise as the result of bacterial action in cases of constipation from stasis in various portions of the gastro-intestinal tract, but it is hoped to treat of some of these, which are of high importance, on a future occasion.

Hitherto attention has been directed mainly to the deleterious action of this Amine, but before concluding I should like to add one observation of a different kind, taken from a totally different point of view.

The fact that such marked lymphocytosis follows the administration of the Amine suggested that its employment might be of some therapeutic value in diseases such as tuberculosis, where lymphocytosis occurs in the attempt on the part of the body to react protectively against the invasion of the bacillus.

As regards the practical utility of this form of treatment, however, I have not yet obtained sufficient data to justify any decided statement.

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A BINET SCALE FOR THE BLIND.

By W. B. DRUMMOND, M.D., F.R.C.P.E.,
Medical Superintendent, Baldovan Institution.

(Continued from page 31.)

PART II.—THE SUGGESTED SCALE.

The tests are to be applied in a quiet room, preferably in the forenoon, when the child is not tired. The "Directions to Examiners" detailed in the Appendix to the English translation of Binet and Simon's *Mentally Defective Children* are to be carefully followed. It is essential that the examiner should be familiar, by practical experience, with the method of testing normal children, and should know the kind of responses normal children give to the various tests. What one wishes to discover is how the blind child under examination compares with the average normal child of the same age. The comparison is with the average normal seeing child, not with a hypothetical average blind child. It has already been pointed out that blind children belong to several categories. Standards for these categories do not at present exist.

The caution that the examiner must be careful not to ally himself on the side of the child, and help him by hints or explanations beyond those given in the directions for the individual tests, is even more necessary in the case of the blind than in the case of seeing children. If the child does not understand the question without any special explanation he has failed. Again, if a child succeeds partially with tests he should not, as a general rule, receive any credit at all. Half or quarter credits should not be given. Occasionally, when a child almost succeeds with several tests, it may appear that a fairer indication of his mental level is obtained by allowing some credit than by calling all the partial successes failures, but in the great majority of cases the rule to avoid partial credits should be adhered to.

Another point that deserves mention is the tendency among children to automatisms. This tendency is sometimes encouraged by the examiner's apparent satisfaction with any kind of answer. Thus a child who finds that his statement that "a fork is silver" (IX, 2) is accepted may go on to say, "a table is wood," "a chair is wood," "a horse is flesh," "a mother is flesh."

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A child who is quite capable of giving answers superior to the "use" type, may yet adopt the "use" type for all his replies simply because his first reply happened to be "A fork is for eating." In such a case, when the examiner thinks that the child has not done himself justice, it is allowable, after completing the examination, to repeat the test again, without giving any further explanation or hinting that the previous replies were unsatisfactory, but giving the parts of the test in a different order, *e.g.* by asking first "What is a horse?"

The Tests.

THREE YEARS.

1. Say "Show me your eyes"; "Show me your nose"; "Show me your mouth."

Count the child correct if he indicates in any way that he understands.

Be sure you don't help the child in any way. Do not make any sign or gesture indicating what is to be done. The chief object of the test is to discover whether the child can understand spoken language. If the child simply holds up his face to be looked at, say, with emphasis, "Yes, but *which* are your eyes?" "*Which* is your nose?" "*Which* is your mouth?" Don't give the child credit unless he points out the parts asked for.

2. Say, "I am going to say two numbers. Say them after me: 3, 7"—"Again, 6, 4"—"Again, 0, 5."

The examiner must say the figures slowly; an interval of half a second should be allowed between the two. The child passes if he is successful once out of the three trials.

3. Say, "What is your name?"

For a pass the surname must be given, but if the child says his Christian name only, the examiner may press him by asking, "What else?" Do not ask, "What is your father's name?" That is a more difficult question at this level. The child might legitimately answer, "He is called Daddy."

4. "Say this sentence after me: 'I am cold and hungry.'"

If the child is timid he may be tried first with shorter sentences. A sentence containing six syllables should be remembered at this level.

Defective pronunciation should be noted, but give the child credit if he pronounces the words intelligibly. At this level perfect articulation is not to be expected.

A Binet Scale for the Blind

FOUR YEARS.

1. If the subject is a boy, say, "Are you a little boy or a little girl?" If she is a girl, say, "Are you a little girl or a little boy?" The object of reversing the questions is to avoid obtaining a correct answer from echolalia.

In some cases, the question may be divided: "Are you a little boy?" "Are you a little girl?" If this is done, both questions must be given, as some children will say "yes" to any question asked.

2. Say, "What is this?"—"And this?"—"And this?"

The examiner shows the child successively a key, a penny, and a knife. Other *familiar* objects may be substituted, *e.g.* a boot, a spoon, a plate. In the case of some institution children the last-named objects are preferable to the three selected by Binet. Slight deviations from accuracy may be accepted, *e.g.* if the child calls a penny "money" or even a "ha'penny"; but all three objects must be named.

3. "I am going to say three numbers. I want you to repeat them. Listen: 2, 7, 5." "Again, 9, 0, 4." "Again, 3, 8, 1."

One success suffices. (See III., 2.)

4. Give the child two sticks, *e.g.* two pieces of pencil respectively 4 and 6 cm. long. Place one piece in each of the child's hands, and say, "One of these sticks is longer than the other. Give me the long one." Repeat the test, reversing the position of the sticks. If the child asks if he may place them together, say, "If you like," but don't, of course, tell him to do this. To pass, the child must be correct both times.

FIVE YEARS.

1. Say, "Here are two weights. They are the same size, but one is heavier and one is lighter. Give me the heavier one"; or, "Give me the heavy one?" Two boxes or two weighted corks of exactly the same shape and size, but weighing respectively 3 and 12 grammes, are used. The test is repeated with two weighing 6 and 15 grammes. As this is a test of sensory discrimination, the child should be told to hold out his hands, and one weight should be placed in each. The heavier weight is to be placed alternately in the right and the left hand. To pass, the child must be correct in both trials.

When this test is given to a very young normal child, he is apt to respond by pointing haphazard to one of the weights

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without weighing them. As to this, Binet says, "We are indulgent and readily pass over this naïve blunder, which is explained sometimes by the thoughtlessness of the child, or by suggestibility, or by a desire to please us, and we say to him, "No, that is not right. You must take the two boxes in your hand and weigh them." No doubt it renders the test somewhat easier to place the weights in the child's hands as directed above; but against this is the fact that any test involving even slight manual dexterity is more difficult for a blind child than for a normal one.

2. Say, "Listen to this, and repeat it after me: 'My name is Charlie. Oh! the naughty dog!'"

If the child's pronunciation is defective, give credit if all the syllables are given. Memory of a sentence containing ten syllables after hearing it once is required. Sometimes a child impulsively begins to repeat before the examiner has finished. Defective children are particularly apt to do this. In such a case say, "Don't speak till I have finished. Now, listen to this." Then give an alternative sentence, or rather (following Binet's example) two disconnected phrases, *e.g.*, "His name is Thomas. It is a fine day."

3. Say, "Here are some pennies. Count them and tell me how many there are." Four pennies are laid on the table, touching, but not superposed. They must not be laid down so that the child can hear them being arranged.

4. Reversing two figures. Say, "I am going to say two figures and I want you to say the same two figures, but backwards. If I say 3, 4, you must say 4, 3; if I say 7, 2, you must say, 2, 7. Now listen carefully: '1, 4.' 'Again, 9, 2.' 'Again, 5, 7.'" One success suffices. If the child makes a mistake, don't say he is wrong, but say, "Now listen again, and when you have heard the figures, repeat them backwards, now." Pause for one second between the figures.

SIX YEARS.

1. "Is it morning or afternoon?" Little children naturally regard "morning" and "afternoon" as synonymous with before and after dinner. Consequently, if a child who has dinner at 1 P.M. is examined at 12.15 and says, "It is morning" or "It is forenoon," he should be counted correct.

2. "What is a fork?" "What is a table?" "A chair?" "A horse?" "A mamma?" At this age it suffices if the child

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states the use of the object, namely, *e.g.*, "A fork is for eating with"; "A chair's what you sit on." If the child simply repeats "A chair is a chair," he is marked minus. If he points to or touches a chair, saying, "That's one," his answer is not acceptable, but as it is intelligent the examiner should say, "Yes, but tell me, What *is* a chair?" A *definition* of some kind is what is asked for. Repetition, *e.g.* "It is a chair" counts a failure.

3. "Count these pennies." Thirteen pennies are placed on the table in a group (not in a line) touching one another, but not superposed.

4. "Here are two pieces of cloth. Take one in each hand, feel them, and show me which feels nicer." Use successively (*a*) serge and silk, (*b*) velvet and serge, (*c*) velvet and carpet. The child must be right three times (*vide* Aesthetic Test, p. 25).

SEVEN YEARS.

1. "Show me your right hand." "Show me your left ear." A quite spontaneous correction should be accepted, but care must be taken to give no hints. If the child touches one hand with the other so that it is not clear which he means, say, "Hold up your right hand."

2. "How many fingers have you on your right hand?" "How many on your left hand?" "How many altogether?" The child must answer all three questions correctly without any hesitation. He must not stop to think, or be allowed to count his fingers. (From Binet's 1908 scale.)

3. Reversing three numbers—*e.g.*, 2, 9, 5; 3, 6, 1; 7, 5, 8. See V., 4.

4. "If to-day were Friday, what day would yesterday be?" Try again, using two other days. Two correct answers suffice.

EIGHT YEARS.

1. "You know what paper is?" "And cloth?" "Are they exactly like each other?" "Very well, tell me in what way they are not alike."

The same questions are asked about an orange and a ball; and wood and glass. Two comparisons must be given correctly. One difference in each case will suffice. Some children take a long time to think about these questions. Two minutes may be allowed as the limit for the test.

2. "You can count, can't you?" "Well, will you count for me backwards from twenty to nothing? Begin 20, 19 . . ."

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One error is allowed, but the task must be finished in thirty seconds.

Binet allows only twenty seconds for this task, but this appears to be too little. Moreover, he gives no precise directions as to when to begin to count the same. Some allowance may also in fairness be made for children who are naturally deliberate. Even the suggested limit of thirty seconds may be read as "*about* thirty seconds."

3. "Can you tell me what day it is?" "And will you tell me the date also?"

The year must be given; three or four days' latitude is allowed in the day of the month.

If the child gives the day and month only, the examiner may add, "And what year is it?"

4. "I am going to say five numbers. Listen and repeat them after me": "5, 8, 2, 9, 1." "Again, 3, 7, 5, 2, 0." "Again, 1, 3, 7, 2, 9." One success suffices.

NINE YEARS.

1. "What is a fork?" "What is a table?" "A chair?" "A horse?" "A mother?"

For a pass three at least of the definitions must be given in a form superior to the "use" type. (See VI., 2.)

2. "Will you tell me the names of the months in order?"

Do not give the child a start by naming a month. The child may start with any month he likes.

One omission or one inversion is allowed to pass.

3. "What should you do if you missed a train?" "What should you do if one of your playmates should hit you without meaning to do so?" "What should you do if you broke something belonging to someone else?"

For a pass two at least of these questions must be answered sensibly.

4. "You know an orange?" "And a ball?" "Well, in what way are they like each other?" The same questions are asked about wood and coal, and an apple and a banana. In at least two cases correct *resemblances* must be given. If the child replies, "They are not like each other," the examiner should say, "Oh yes, in some ways they are alike. Now, tell me, how are they like each other?"

TEN YEARS.

1. "I am going to say six numbers to you, and I want you

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to repeat them after me." "Now, 6, 1, 8, 3, 7, 2." "Again, 7, 3, 6, 9, 1, 5." "Again, 9, 3, 1, 4, 8, 2." One success suffices.

2. "I am going to read you some sentences, each of which contains something foolish. Listen attentively and tell me each time what is foolish."

The examiner reads the sentences impressively, but without any special emphasis on the part the child should comment on. Each time when he finishes he changes his tone, and demands, "What is foolish in that?"

Sentences.—(1) An unfortunate bicycle rider fell on his head and was killed instantly; he was taken to a hospital, and they fear he will not recover.

(2) I have three brothers—Paul, Ernest, and myself.

(3) The body of an unfortunate young girl, cut into eighteen pieces, was found yesterday on the fortifications. It is thought that she killed herself.

(4) There was a railway accident yesterday, but it was not a bad one; the number of dead is only forty-eight.

(5) Someone said: If I should ever grow desperate and kill myself, I will not choose Friday because Friday is an unlucky day, and will bring me unhappiness. Three satisfactory answers are required.

3. "What would you do if you were going to school and thought you were late?" (The only acceptable answer is one implying "I would hurry.") "What would you do before taking part in something very important?" "Why is a bad action done when one is angry more excusable than the same action done when one is not angry?" "What would you do if you were asked your opinion of someone whom you did not know well?" "Why should one judge a person by his acts rather than by his words?" Three sensible answers should be given.

4. "I am going to read you three words, and I want you to make a sentence and use in it the three words. The words are Paris, fortune, stream."

The expression "make a sentence" must not be further explained, but the instructions may be repeated. For a pass the sentence should be well co-ordinated. At this stage it may contain two distinct ideas, but not three; at the higher level it must contain only one idea (See XII., 2). One minute is the time allowed.

TWELVE YEARS.

1. "I am going to say four numbers, and I want you to repeat them in the reverse order." Give an example, then say, "Now,

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2, 9, 5, 3." "Again, 6, 1, 8, 4." "Again, 7, 3, 9, 5." One success suffices.

2. "I am going to read you three words. I want you to make a sentence and use in it the three words. The words are Paris, fortune, stream." For directions see X., 4.

3. "I am going to allow three minutes, and I want you to say as many words as you can think of. Some children have said more than two hundred. Let us see how many you can do. Ready? Start." In order to pass, the child must say over sixty words.

4. "What is Charity?" "What is Justice?" "What is Kindness?" Two correct responses are required.

Charity.—The answer should contain two ideas:—(1) Kindness (2) to someone in need. *Justice.*—If the child says "a judge," say, "Yes, but when we speak of doing justice, what does 'justice' mean?" The answer must contain the idea of persons treated according to their deserts. *Kindness.*—The answer must imply the doing of good acts to others. "Kindness is being kind" is not an acceptable answer. Repeat the question.

FIFTEEN YEARS.

1. "I am going to say seven numbers to you, and I want you to repeat them after me. Now, 5, 2, 7, 9, 1, 6, 0." "Again, 6, 4, 1, 3, 9, 7, 5." "Again, 8, 0, 4, 2, 7, 3, 6." One success suffices.

2. "Do you know the meaning of the word 'rhyme'? Two words are said to rhyme when they have similar endings, such as hour and flower, or candy and dandy. Do you understand? Now, find all the words which rhyme with day."

The child is required to find three rhymes in one minute.

3. To tell the moral of simple fables (see p. 29).

4. To reverse given numbers (see XII., 1). *E.g.*, "3, 6, 4, 9, 1." "8, 1, 5, 2, 9." "1, 8, 3, 6, 4."

This scale provides four tests for each year, whereas the Binet-Simon Scale provides five. Various alternative tests which have been tried successfully on blind children might have been included in the scale, but this would have involved having an unequal number of tests for the different ages. The advantage of having the same number of tests for each age is that one can adopt the same system of marking as is used with the ordinary Binet-Simon Scale. That is to say, the mental

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age of the child is the highest age all the tests for which are passed, plus one year for every four tests passed from higher ages.

Binet and other Tests with year assigned.

Designation of Test.	Binet, 1911. Normal Children.	Goddard. Normal Children.	Terman. Normal Children.	Haines. Blind Children.	Drummond. Blind Children.
1. Comparison of Weights: 6 and 15 and 9 and 18 grammes	V.	V.	V.	Below VII.	V.
2. Definitions superior to Use	IX.	IX.	IX.	X.	IX.
3. Difference between two things	VIII.	VIII.	VIII.	VIII.?	VIII.
4. Resemblances between two things	...	...	...	...	IX.
5. Counting 20 to 1 . .	VIII.	VIII.	VIII.	VIII.?	VIII.
6. Day and Date . . .	VIII.	IX.	IX.	X. +	X.
7. Memory 5 digits. . .	VIII.	VIII.	VII.	...	VIII.
8. " 6 " . . .	...	X.	X.	VIII.?	X.
9. " 7 " . . .	XV.	XII.	XIV.	X.	XII.
10. " 8 " . . .	...	...	XVIII.	XVI.?	...
11. Naming Months . .	IX.	IX. (1 omiss.)	X. (0 omiss.) (3 checks)	VIII.? (3 checks)	VIII.
12. Comprehension 3rd degree (<i>i.e.</i> B.'s questions IX. 5)	IX.	...	VIII.	IX.	VIII.
13. Comprehension 4th degree (<i>i.e.</i> B.'s questions X. 4)	X.	...	XI.	XII.	XV.?
14. Arranging Weights .	X.	IX.	X.	X. +	X.
15. Absurdities . . .	X. (3 of 5)	XI. (3 of 5)	XI. (4 of 5)	XI. (3 of 5) XIV. (4 of 5)	X.
16. Three words in two sentences	X.	X. half succeed XI. all succeed	...	XI.	...
17. Sixty words in three minutes	XII.	XI.	IX.	XII. (3 in 1)	XII.
18. Defines three abstract terms (B. XII. 4)	XII.	XII.	XII.	XI. (1 of 3) XIV. (3 of 3)	XII.
19. Disarranged sentences .	XII.	XII.	XII.	XIV.	...
20. Rhymes . . .	XV.	XI.	IX.	X.	XII. +
21. Problems . . .	XV.	XII.	XIV.	...	XVI.?
22. King and President (B. Adult)	Adult	Adult	XVI.	XV.	...
23. Comparison of sticks of 4 and 6 centimetres	...	...	...	...	IV.
24. Aesthetic Test . . .	...	...	...	...	VI.
25. Reversing 2 numbers . .	...	...	...	...	V.
26. Reversing 3 numbers . .	...	...	...	...	VII.
27. Reversing 4 numbers . .	...	...	...	...	XII.
28. Reversing 5 numbers . .	...	...	...	...	XV.
29. Giving moral of fables .	...	...	...	...	XV.

AN INTRODUCTION TO PSYCHOTHERAPY.*

By GEORGE ROBERTSON, Professor of Psychiatry in the University of Edinburgh, and Physician to the Royal Asylum.

THE subject of psychotherapy is one of great importance to the physician, but this truth has only been realised in very recent times. As a science it was unknown and untaught a generation ago. There was indeed some advice occasionally thrown out by our teachers to "treat the patient" as well as his disease, but there was little said as to how this was to be done. More often we heard cheap sneers about "fine bedside manners." Psychotherapy was nevertheless employed by those who sneered, and it was even practised successfully by them as it has been in all ages and in every country. It was, however, practised unconsciously. It was called by other names and its action was attributed to other agencies.

The science of psychotherapy being a comparatively modern one still labours under many disadvantages. The classical conception of disease adopted in all our textbooks is entirely based upon a materialistic or solid pathology. The symptoms of disease, that is the altered functions, if any attention be paid to them, receive merely a physical or at most a physiological explanation. The treatment of disease is mainly confined to the use of chemical reagents or drugs. It is very necessary to investigate and treat disease from this standpoint, and it is assumed in what follows that such knowledge is essential. It is, however, equally necessary that disease should be studied from a totally different standpoint, a mental one. Not that this new point of view enables us to see the whole picture and the entire structure of disease, but it does give us a very different and a very useful conception of its symptoms and their treatment.

THE SYMPTOMS OF DISEASE, MENTAL.

In the first place, do all physicians realise as fully as they ought to, the extent to which the ordinary symptoms of disease are essentially mental? The typical and most common symptom of disease is, of course, pain. Short of actual pain

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we also have the related conditions of malaise, discomfort, uneasiness, ill-being, etc. These are really all different forms of pain ; pain more vague and less acute, pain more diffuse and less localised. From this point of view let us now picture a patient suffering from lobar pneumonia, having expelled from our minds for the moment, not an easy task for the scientific physician, all preconceived and dominating ideas of a solidified lung or an organismal toxæmia, and what do we find? Almost every symptom of which the patient complains to his physician is included under pain, discomfort, or ill-being. Pain is a form of sensation and it is a purely mental phenomenon. The processes accompanying this sensation occur in the higher realms of the brain. To feel pain acutely and to localise it exactly, it is necessary to be fully conscious. If the mind be in abeyance, if the patient be unconscious, as for example under chloroform, the patient does not suffer pain. If by means of psychotherapeutic measures, without being rendered totally unconscious, pain and malaise can not be felt by the patient, he is relieved of almost all his symptoms and his sufferings, as surely as if he were chloroformed. These complaints, be it remembered, are the only matters which the patient is concerned with, and not with his hepatised lung or toxæmia. He knows nothing about these and the less he knows the better.

A practical demonstration of these facts was given to me nearly thirty years ago, when I accompanied Professor Bernheim round his wards in the Hospital of Nancy. He came to a patient suffering from pneumonia and asked the usual questions about sleep, appetite, well-being, progress, etc. He then by slight hypnosis, dispelled by suggestion all unpleasant symptoms and implanted a favourable atmosphere and outlook in the mind of the patient. He did not neglect to treat the patient by the usual drugs on orthodox lines, but his patient suffered less owing to the employment of psychotherapy in combination with these drugs. In a critical case this auxiliary relief might have turned the scale and saved the patient's life.

Further, with regard to symptoms, of which pain is the type, there is confusion in the minds of most physicians between the nature of what is imaginary or functional and what is organic. They can understand, they say, the symptom of pain produced by the imagination being removed by psychotherapy, but they do not see how the symptom of pain due to an organic cause can so be relieved. There is, however, no essential difference

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between these classes of pain. Let us take for example the pain, often very severe, that is due to a carious tooth or a whitlow. The organic disease is in the tooth or finger and in the nerve endings there, but the pain is felt accompanying processes that are taking place within the brain, where there is no disease at all. If the whitlow be in the little finger and the ulnar nerve be divided, the patient does not suffer pain, though the whitlow runs its usual course. The mental phenomena are therefore the same whatever be the variety of pain, whether of so-called imaginary and functional origin or of organic origin, and all forms of pain being mental symptoms, are amenable to psychotherapy. It is not alleged that all varieties of pain are equally amenable, just as it is not alleged that all persons and all ages are equally amenable. Pain and its analogues, malaise, discomfort, ill-being, etc., whether of functional or organic origin, being essentially mental phenomena arising in the brain, can all be removed by psychotherapy.

As a concrete example of this generalisation, I give the case of the wife of the late General Booth who suffered agonies from cancer. She was induced, when all else had failed, to try Count Mattei's remedy, which consisted, we are told, of electricity extracted from growing plants preserved in distilled water, and it was of various colours, red, green, blue, etc., for various ailments. The first few drops of this remedy removed all Mrs Booth's pain, and she eventually died without any further suffering. In this case of an inoperable cancer, this result was the best that could possibly have been obtained by the most famous and skilful physician or surgeon, and it must have seemed to the patient like a blessing sent from heaven. It so impressed Mr Stead, an honest and fearless man if ever there was one, that he advertised the remedy largely. Needless to say the remedy itself is inert, and the result was purely psychotherapeutic; but if such blessed relief from suffering can be obtained so simply, why should not every physician know about it? Why should he not have the power of conferring it? and why should anyone be ashamed of benefiting his patients by the employment of such simple means?

Further, it may be pointed out that the distinction between ordinary physical pain and what is often called mental pain is more indefinite than is realised. They are frequently confused with one another and they often coexist. I have seen a boy receive a great disappointment who at once complained of

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headache and illness, though he was really suffering from mental depression. I have known a very suicidal patient complain of acute pain who could not tell me where the pain was, because she was really suffering from melancholia. On the other hand, Dr Haultain has told me of a lady who every time her uterus became displaced, instead of complaining of discomfort, suffered from depression, which at once disappeared when the error was rectified. Finally, I have known a patient suffering from melancholia at first attribute her condition to ill health and consumption. I thereupon, as a psychotherapeutic procedure, called in Sir Robert Philip, who assured her that her lungs were healthy, and having faith in him she accepted his suggestion. Then she developed the idea that her state was not a physical but a moral one. She believed that she was suffering punishment for having committed sin, and that she had been cast off by God. The conversion of mental into physical pain, and *vice versa*, is seen from these examples to be a simple process, and it therefore accentuates what has already been said of the essentially mental nature of the symptoms of disease.

The two illustrations of symptoms relieved, namely that of pneumonia and that of cancer, representing a very large class of cases, are examples of negative hallucination. That is to say, by some mental process the mind ignores, rejects, or is unable to receive sensations of a certain class. Consciousness appears to be normal, but it has a blind spot or an area of anæsthesia to a definite class of sensations forming the symptoms. An experiment illustrating these features is easily performed on a good hypnotic subject by giving her a post hypnotic suggestion that on awakening from hypnosis she is not to see a particular individual present in the room. The result is very curious and often amusing. The person indicated is completely ignored, and the patient does not appear to be even conscious that the body of this person is blotting out part of the landscape, if he stands between the patient and an object. This observation is the less remarkable when it is remembered that no one is conscious of the blind spot in his own eye which blots out a part of the visual field. Hysterical anæsthesia is, of course, a typical example of negative hallucination, of this failure to be conscious of stimuli affecting certain nerves and organs of sense.

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SUGGESTION IN DISEASE AND TREATMENT.

If negative hallucinations be of greater service in the removal of symptoms, positive hallucinations explain more frequently their occurrence. It is known that if the experiment be made of fixing the attention closely for a long time on one part of the body that sensations or symptoms will be experienced there. Especially is this the case under two conditions, firstly, if emotion be present, that is, if the patient be expectant or if he be anxious or apprehensive of harm, and secondly, if an idea has been consciously or unconsciously suggested to the patient, either by himself or another. For example, Dubois set up an electric battery, with wires terminating in rings which were placed on the fingers of certain persons. The arms of the dial regulating the strength of the current were then moved about. Two-thirds of those upon whom the experiment was made felt a current of electricity passing through their fingers, although the whole apparatus was a make-up and the arms of the dial were moved merely to convey a suggestion. It follows that the physician must realise fully the part played by suggestion and suggestibility in disease. This varies very greatly in different persons. It is more marked in children than in adults, and in women than in men. It varies from time to time in the same person, and is more marked when he is under the influence of strong emotion. It is most marked when the patient is exhausted, and when he is suffering from a toxæmia. The ideal state for its operation is when these conditions are all present together and when the inheritance of the patient is a highly neurotic one. For example, in patients suffering from mild delirium tremens, I have been able to suggest any symptom I pleased, and as many as I pleased. In some cases, even if the patient be handed a clean sheet of paper, told it is a letter from a friend and asked to read it aloud, he will do so.

Now the important point to be realised is this, that every one, even the most strong-minded, is suggestible. Indeed, one who is regarded as a particularly strong-minded person may be specially suggestible to hypochondriacal ideas. In every case of illness, then, it is possible that some of the symptoms of which the patient complains are the result of suggestion alone, and in more cases than is suspected, most of the symptoms may be due to this cause. They therefore would come under the category of being purely functional. One simple case that made

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an early and a deep impression upon me, was that of a young relative who was under my close observation. He suffered from a severe attack of sciatica from which he had obviously recovered. His general activity, his athletic feats, and his high spirits were sufficient evidence of this. When, however, any visitor asked him how he felt and directed his attention to the subject, his face fell, his tones became lugubrious, and he complained that he was far from being well. Deceit was here out of the question. At the most he may have got more sympathy than he deserved. If he had been consciously or unconsciously encouraged, if he had by chance been placed in a suitable atmosphere, he would have continued to believe in his imaginary pain for an indefinite time.

Further, as regards unconscious tension, rigidity or immobility of muscle, I found a very good example in myself recently. I had a small abscess in my axilla which I treated with a boracic poultice. To keep the dressing in its place I held my arm tight to my side, and I had most need to do this when I was dressing. Some days after the abscess had recovered, I found myself one morning unconsciously holding my arm in a constrained and tight position to my side. After some thought I discovered the unconscious mental origin of this, and as a result was able to cure myself of this now useless habit.

The above cases have the two-fold merit of being very simple and quite reliable. They lead up to that large group of cases in which recovery from injuries, accompanied by pain and rigidity, received during the War, was very slow indeed. These in their turn are not essentially different from the still larger group of cases in which the injury was slight and the symptoms should have been evanescent, but which became chronic, developed in number and importance, and eventually produced serious disabilities. These symptoms were mainly due to auto-suggestion and were removable by psychotherapy. There was an interesting article on the "Hysterical Complications of Rheumatism," by Dr Gordon, in the October number of the *Edinburgh Medical Journal*, giving examples of such cases.

The instances I have given above are of auto-suggestion, but suggestion may be given by others, and the person who is most likely to give it is the nurse or relative in attendance, or even the physician himself. It is of course given unconsciously and it is usually adopted unconsciously. It is a fault that the most attentive, the most thorough, and the most devoted physician is

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the most likely to fall into. The more frequently he examines a patient, the more enquiries he makes of symptoms, and the more remedies he applies, the greater is the likelihood of him implanting suggestions, especially if his efforts be supplemented by the attentions of a sympathetic and devoted relative. Many cases of long continued ailments and invalidism are mainly due to this cause. If anyone doubts it, let him think of the great Charcot and his cases of hysteria. I enjoyed the privilege of a demonstration from him of their extraordinary symptomatology, and we now know that these remarkable symptoms of a wonderful series of cases of hysteria major, each presenting dramatic features, were all unconsciously suggested by him and his assistants. If such an accurate and careful observer, one of the greatest medical men that ever lived, fell into this pit, may not lesser mortals like ourselves do the same.

Disease in any part of the body, especially if it be of a toxic nature, affects the mind and lowers the normal level of its working, so that this becomes more feminine, and more childish in character. The patient then becomes more suggestible, both to his own fancies and to the influence exerted on him by others for good or for evil. It is therefore an essential part of scientific treatment under these conditions that the source of this toxin should be removed, that the toxin should be flushed out of the system, or that its activity should be neutralised by an antidote or serum, if any of these measures be possible, when use is made of psychotherapy.

ACTION OF THE MIND ON THE BODY.

In the third place the physician must realise the extent to which the mind may act on the body and every one of its functions. Some are prepared to admit that all nervous disorders, excepting those directly due to destruction of nervous tissues, may be removed by psychotherapy, but believe that its usefulness is strictly limited to functional nervous disorders. In answer to this it must of course be admitted that psychotherapy cannot destroy the syphilitic spirochæte, cannot remove a clot from the internal capsule, and cannot repair any serious organic change. If it cannot effect a cure in cases of advanced disease accompanied by organic changes, it differs little in this from ordinary therapy, while in almost every instance it can assist and give relief to suffering as in Mrs Booth's case. In the early stages of disease, before serious organic changes have

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actually resulted, and in the stage when recoveries by any therapeutic means whatever can be hoped for, the influence of the mind over the body is enormous and is insufficiently realised. Further, the line of demarcation between mental and nervous processes on the one hand, and obvious physical changes and organic disease of the body on the other, is becoming more blurred and uncertain every day with increasing knowledge. They are found to overlap and coexist, to be mixed and fused. This is, for example, the case with the emotions. Can anyone assert that the part played by consciousness in the feeling of fright is biologically a more essential part of fright than its well-known motor, secretory, and vaso-motor accompaniments. According to James the latter are the primary and essential elements of the emotion. We now know also how close is the connection between the internal secretory glands and emotion. If fright and anxiety, for anxiety according to Hughlings Jackson is only fright spread out thin, be accompanied by an excess of adrenal secretion, how many chronic disorders and ultimately organic changes may not be traced to the mind through excess of this secretion. Vascular disease, kidney disease, heart disease, and many sclerotic diseases may have an origin of this kind. That the mind can act upon the body and can influence every function is a well-established fact. It affects digestion, it acts on the heart and circulation, and may even go the length of producing organic changes. I need only mention as a conclusive example of the last, that blisters can be produced by means of mental suggestion alone. During the War this experiment was again performed successfully on a soldier in a military hospital, in which case every possible precaution was taken by means of protective dressings to prevent access to the part by the patient or others. In addition, to make assurance doubly sure and to eliminate every chance of fraud, a military guard was placed on duty over the patient.

While the action of the mind on the body is so extensive, needless to say, it has its limitations. It is still necessary for the physician to study pathology and to become a skilled clinician. His failure to diagnose disease might otherwise result in his failure to adopt other measures, as in the case of an operable cancer. It might also result in his adoption of psychotherapy for the treatment of an irrecoverable condition. Psychotherapy as distinguished from all those related practices which insensibly and inevitably pass into superstition, humbug,

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and fraud, can only be preserved in an honest and pure form in the keeping of an educated and skilled profession, with honourable traditions and a scientific spirit.

THE PRACTICE OF PSYCHOTHERAPY.

Having now described the mental nature of the common symptoms of disease, the place suggestion plays in the causation of symptoms and their cure, and the influence of the mind on the body, I now pass to refer to the practice of psychotherapy which is based upon this knowledge. It was first employed consciously and intentionally in the medical profession by Pinel, when he introduced what he called the "Moral treatment of the Insane," during the French Revolution. He then undoubtedly took the first step in scientific psychotherapy. The next advance was probably made when Liebault and Bernheim at Nancy, about 1880, consciously employed mental suggestion under hypnosis to remove the symptoms of disease. Soon after this they discovered that suggestion could often be equally efficacious in the waking state. This discovery at once threw a flood of light on a whole host of miraculous cures, which had troubled the minds of regular practitioners of medicine for generations, and cast a slur on their professional skill. It was perceived that mental suggestion and the influence of the mind on the body could account satisfactorily for these wonderful recoveries, and every year has added proof confirming this opinion.

To draw out a complete list of the agencies employed in the past, whose action was essentially psychotherapeutic, though attributed to some other quality, would take a considerable time. Their employment goes back to prehistoric days and to utter barbarism. They are, however, still popular to-day, and that even among the most educated and civilised peoples of the world. Out of a long list may be mentioned, first, amulets and charms, faith in which has not yet died out. Even the humble potato carried on the person is believed by many to-day to ward off rheumatism. In the past curious nostrums of all kinds, such as the wonderful Weapon Salve and the Sympathetic Powder, were believed in. The former cured wounds when the weapon that caused the wound was itself anointed with the salve; the latter cured by sympathy when the blood-stained garments worn by the wounded man were dusted with the powder. The success of these remedies is, however, paralleled

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by that of some of the much advertised patent medicines of the present day, whose contents are well known to be inert. Faith cures and cures by means of religious relics at one period played a most important rôle in therapeutics, and still do so. In modern times, with the spread of scientific knowledge and psychical research, many have pinned their faith to animal magnetism and mesmerism. Others still more recently to mind cures and Christian science.

That these purely psychotherapeutic measures, however absurd and inherently impotent, were, and are, successful, cannot possibly be denied. For regular practitioners of medicine to ignore their striking successes is conduct on a par with that of the ostrich which buries its head in the sand. It is believed, for example, that during the time that Perkins' Tractors maintained their reputation, a period of about ten years, they effected more wonderful cures than any other therapeutic agency then employed. Their success was simply phenomenal. Yet when it was found that spurious tractors were equally successful, if the patient did not suspect their genuineness, their success left them suddenly for ever. The history of their employment, however, enforces on us very important lessons. It teaches us firstly, that faith alone is a most potent curative agent; secondly, that the majority of the ordinary symptoms complained of are mental in nature and removable; and thirdly, that successful results in the treatment of disease, unless the psychotherapeutic factor has been absolutely excluded, is no proof of the action of any drug or other agent that may happen to have been employed. The success of many new drugs is notoriously psychotherapeutic. They come into fashion and are then cast aside as worthless with monotonous regularity—hence the advice, "Hurry up and prescribe the new medicine, while it still cures."

METHODS OF PSYCHOTHERAPY.

The scientific practice of psychotherapy by regular practitioners of medicine has passed through the following developments: firstly, that of suggestion in the hypnotic state; secondly, that of suggestion in the waking state; thirdly, that of persuasion and of re-education.

Immediate success often follows suggestion whether given under hypnosis or without it, and this is often all that is necessary in the case of slight and transient symptoms. In the more serious and chronic states the removal of a particular

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symptom by suggestion does not produce a permanent recovery, as it does not remove the underlying condition of morbid suggestibility to which the symptom is due. It is then naturally found that relapses often occur. A new symptom takes the place of that which has been rejected, and the last state of the patient may be worse than the first. To overcome this underlying suggestibility and to strengthen the will to resist, Dubois introduced the method of persuasion, which consists of heart to heart talks with the patient on the whole subject of his nervous symptoms. This of course presupposes an intimate knowledge of psychology, psychopathology, and human nature on the part of the physician, as well as rare personal qualities. Dubois states that persuasion should be honest, logical, and rational, a combination of argument, explanation, and education. He thinks that a direct appeal should be made to the intellect, but one cannot get away from the psychological fact that all degrees of belief are essentially effects. In states of doubt, probability, and certainty, feeling as well as the intellect is involved. James has accordingly said that a person may even sweat with conviction without knowing what it was about. Hope, expectation, faith, belief, conviction must be present, for according to Dejerine, persuasion can only be successful when such feelings have been influenced as well as the intellect. The employment of the term persuasion is itself a proof of this emotional colouring, for no one would think of describing the cold process of clear reasoning that Euclid employs by the name persuasion. Persuasion therefore is to some extent the form of suggestion that is suitable for a patient in the waking state.

Upon the element of education, or as it is often called re-education, largely rests the completeness and permanence of the cure, for by it the patient is given an insight into his general mental condition. The mental nature of his symptoms is explained to him, he is encouraged in his resistance to morbid habits of mind, and his mental outlook is brightened. He is thus brought nearer to the normal. To these processes Dr William Brown has given the appropriate name of autognosis, for by them the physician unravels the tangled past of the patient's life and reveals to him his present difficulties. He demonstrates the connection between these mental antecedents and the symptoms of which the patient complains. When once these are understood by the patient and acted upon, he is cured, for his mal-adaptations cease when he knows himself.

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These various methods, hypnosis, suggestion, persuasion, and re-education although described separately may all be combined in the treatment of the same case, with profit, if thought necessary.

During the last ten or fifteen years it has finally been found that the patient may occasionally be influenced, and influenced most profoundly, by feelings and ideas of which he is quite unconscious. He is then not able to co-operate in his treatment and no persuasion and no explanation is of any use, till the hidden and unconscious origin of his mental or nervous symptoms has been uncovered, brought into the light of day and found out. The process by which this can be done is known as Psychoanalysis. It is not only a method of analysing the mind and a new psychology, but it is also a form of psychotherapy as it is accompanied by relief from the symptoms. It is mainly of use in the more serious neuroses and psychoneuroses.

The discoveries resulting from the practice of psychoanalysis have revolutionised our conception of the constitution of the human mind. In place of the old and medically useless philosophical psychology, it has laid the foundations of a new and practical psychopathology. It has introduced us to many new ideas, such as those of complexes, conflicts, repression, resistance, amnesia, the unconscious, symbolism, conversion, displacement, etc., and these have undoubtedly been of help in understanding mental and nervous symptoms and in their treatment.

New methods of examination have been introduced to probe the unconscious mind, of which three may be mentioned:—The word association test; the method of free association of ideas; and the analysis of dreams. By the first method a stimulus word is spoken, and the word or idea it calls up in the mind of the patient is immediately given and recorded, together with the exact interval of time the process has taken. It is found that a hidden and unknown anxiety will affect the reply by delaying it and by giving a peculiar colour to it, and one thus gets on the track of the unconscious conflict.

Free association of ideas consists in allowing the patient to talk at random, quite aimlessly, anything, however nonsensical, that comes into his head, without exercising any control or direction whatever, and it is found that the ideas, however absurd they may seem, inevitably gravitate to certain subjects, relating to the origin of the symptoms.

The interpretation of dreams has been called the royal road to the unconscious mind. The methods of interpretation have

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been described by Freud, in his work on Dreams, and no one who honestly applies these methods to the interpretation of his own dreams can fail to be convinced of their essential accuracy. The truth of their latent or hidden meaning thus disclosed will fill him with amazement, not unmixed at first with feelings of horror.

Psychoanalysis has its limitations and drawbacks. It is not usually successful in curing persons above middle age; even when successful the treatment may take months, or even longer; and in many cases its complicated procedures are really quite unnecessary and a waste of time and money. In the hands of those who are not careful or skilled, it has given offence and done harm.

PERSONALITY, THE PARAMOUNT FACTOR.

Having now dealt briefly with the various psychotherapeutic methods, and taking a broad survey of the art of healing, I affirm that the greatest therapeutic agent, alas! so often employed unconsciously and in a haphazard way, is the personality of the physician himself. It is not his drugs but the faith his patients have in him that is the secret of his success. Oliver Wendell Holmes held that, if all the drugs that have ever been prescribed had been thrown into the sea, mankind would have been the better for it, and this opinion confirms the truth of the view that the active agent in effecting a cure is the physician. This is, of course, not so in every case of illness, but in the vast majority the hope and confidence begotten by faith in the physician, combined with the *vis medicatrix naturæ*, account in the main for the cure. Faith in the personality of the physician is therefore the greatest therapeutic agent of all. It is the paramount factor in the therapeutic world, though one does not find it included in the British Pharmacopœia, nor is value given to the student who is able to inspire it, in the final professional examination. Want of faith in the physician, on the other hand, or anxiety on his own part, indicating a want of confidence in himself, or solicitude on the part of a relative, likewise implying some degree of doubt, may counteract the influence of the most potent drugs. The instinct of the patient to change his doctor when he has lost faith in him is founded on sound psychotherapeutic principles.

While the personality of the physician is therefore the main

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factor, no physician who has not given special attention to this subject has the faintest idea of the extent to which he employs psychotherapy unconsciously in his own practice. He is consequently quite ignorant of its importance and of its effects, and his power is less efficient and useful than it might be if carefully directed. When I came back from a visit to Paris and Nancy, where the whole attention was being given at the time to Mental Suggestion, I found to my surprise that Dr Clouston, in his visits to his patients, was employing exactly the same words and phrases, implanting exactly the same ideas, and creating the same atmosphere as the hypnotists in France. Thus, without being conscious of what he was doing, without attaching any particular value to it, and without any real recognition of its effects, he was most successfully practising mental suggestion and persuasion every day of his life, upon every patient that he treated. So it is with every successful practitioner in the country. Nor by words alone is mental suggestion conveyed. It may be given in a hundred subtle ways which should all be carefully thought out and studied—for no two persons can be treated with the greatest measure of success in exactly the same way. Among the poor of the dispensary class it is well known that no form of psychotherapy will avail unless it be accompanied by a bottle, however innocent its ingredients. In the West End, the success of psychotherapeutic treatment may depend in part on the fee paid for it. A physician hardly ever prescribes without telling the patient that the medicine he orders is going to do this, that, or the other thing, yet he scarcely ever realises that these few simple words of his may be the essential ingredient in the prescription, without which the medicine would be useless.

In conclusion, every practitioner and student of medicine must be taught the paramount part the mind plays in the chief symptoms of disease, and he must employ in the treatment of these, mental suggestion, persuasion, and re-education, not unconsciously as in the past but with a set purpose and with confidence. His success will depend on the depth of his conviction. If he possesses the gift of healing, the mystic personality that inspires faith in the sick man by which he is made whole, he will not usually require to use either hypnotism or psychoanalysis, though each has its place in therapeutics.

CRITICAL REVIEW

TUBERCULIDES AND THEIR RELATION TO TUBERCULOSIS OF THE SKIN AND OTHER ORGANS.

By R. CRANSTON LOW, M.B., F.R.C.P.

TAKING into consideration the frequency of tuberculosis, the skin is relatively seldom affected. But when the skin does show tuberculosis, the forms in which it may manifest itself are very varied. For some years after the discovery of the Tubercle bacillus it was thought that the only tuberculous lesions were *Lupus vulgaris*, *Tuberculosis cutis verrucosa* (pathologist's wart), *Scrofuloderma*, and *Ulcus tuberculosum cutis*. Within recent years, however, clinical observation and laboratory research have shown that in addition to these four conditions, which have been definitely proved to be due to the presence of living tubercle bacilli, there are numerous others due to or under suspicion of being due to, either modified tubercle bacilli or their toxins.

Of the forms of definite tuberculosis of the skin, the one which perhaps concerns the general physician most is *Lupus vulgaris*, when it occurs as multiple lesions. Numerous small red spots suddenly appear scattered over the face, body, or limbs. These soon show, on pressure with a piece of glass, the typical apple-jelly nodules of tubercle. This form of lupus is most commonly found in children or adolescents, and if not diagnosed in the early stages and suitably treated, the disease soon spreads, to form large patches. Hazen has recently collected records of all published cases of this condition, and although the literature is somewhat scanty the condition is probably not so rare as is generally supposed. It usually follows, within a few days or weeks, an attack of one of the exanthemata, and in by far the majority of cases an attack of measles precedes the appearance of the eruption. Whilst in most cases the eruption begins as a minute red spot, which is not itchy and develops into an ordinary lupus, warty lesions like pathologist's wart or ulcerative forms may occur. The condition is embolic in origin, and means that there must be an active tuberculous focus somewhere, and the physician should make every endeavour to locate it. All isolated small spots suddenly appearing on the skin of a child after measles should be looked upon with suspicion, and kept under observation for some time. The treatment for these cases is the same as for ordinary lupus, but if not too numerous surgical excision of each lesion with a wide margin is the best method for all lesions which occur on the covered parts.

Passing from the definitely tuberculous lesions which usually, sooner or later, come under the care of the dermatologist, there is

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another group of tuberculous skin eruptions, which, from the point of view of general practice, are even more important. This group comprises what are generally known as tuberculides—viz., lichen scrofulosorum, papulo-necrotic tuberculides, sarcoids, and erythema induratum. Of these, lichen scrofulosorum shows the smallest lesion, and the other ones show, in the order mentioned, lesions increasing in size. In all cases of suspected tuberculosis, and especially in children, the skin should be examined for lesions of this type. They often cause no symptoms and are not noticed by the patient, but, if present, are very valuable guides in otherwise doubtful cases. Much the commonest is lichen scrofulosorum, which appears as small papules corresponding to the follicles in the skin of the sides of the chest. The papules, which are usually arranged in groups, are, at first, of a pink colour, slightly raised and surmounted by a minute scale. After a few weeks they get browner in colour and less distinct, but never enlarge in size. This eruption is undoubtedly tuberculous in nature. An absolutely identical eruption may follow the subcutaneous injection of Koch's old tuberculin, and in doubtful cases an injection of that tuberculin will usually bring the eruption of lichen scrofulosorum out again. Whilst the papular form is the most usual one, the eruption, if more acute, may show small vesicles or even pustules. The lesions have the same structure as *Lupus vulgaris*, and the tubercle bacillus, although not easy to demonstrate, has been found by several observers, and in some cases animal inoculation has given positive results. Why these lesions, which are undoubtedly a genuine infection of the skin through the blood stream, do not lead to the lesions of ordinary lupus will be discussed later.

The papulo-necrotic tuberculide, although not so common as lichen scrofulosorum, is equally diagnostic. It was first described some years ago by Darier, and consists of slightly larger lesions than lichen scrofulosorum. As in the latter disease, the eruption shows microscopically the structure of tuberculous tissue. The lesions appear as bluish-red papules which enlarge to the size of small peas. The centre undergoes a process of necrosis with or without definite suppuration, then crusts over and slowly heals. The eruption often closely resembles a secondary syphilide but is bluer in colour, not so hard, and not accompanied by any other sign of syphilis. The lesions are usually scattered over the trunk or limbs and are not itchy. Crops of eruption come out from time to time over a period of weeks or months. Another form of this same eruption has been described under the name of acnitis. It occurs on the face and usually on the forehead. Each spot begins deeper than the papulo-necrotic tuberculide, comes to the surface slowly, breaks down in the centre, scabs over and heals slowly, leaving a minute scar. It looks not unlike the indurated lumpy lesion

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of acne vulgaris, but can be distinguished by the absence of the comedo and other signs of acne. Folliclis is the name given by Bartélemy to the same condition, when it begins as a more superficial nodule which comes to the surface and produces a lesion similar to that of acnitis. Folliclis is seen on the body and limbs and not on the face. All these lesions show the typical tuberculous structure to which necrosis is added, and the reason why these lesions necrose in the centre is that there is an endarteritis and endo-phlebitis of the vessels round the lesion. In several of the cases of papulo-necrotic tuberculide the tubercle bacillus has been found microscopically and by animal inoculation.

Erythema induratum scrofulosorum (Bazin's disease) is the best known and largest of all the tuberculides. It occurs most frequently in young women as rounded or oval bluish-red swellings on the lower part of the backs of the legs. They are firm, painless, and after persisting for weeks may break down and ulcerate. The ulcer usually has a punched-out appearance, very like a broken-down gumma. After healing, a scar, often surrounded by a pigmented area, remains behind. The lesion consists chiefly of a dense mass of small round cells, but the tubercle bacillus has been repeatedly found and animal inoculations have been positive, so that there is no doubt that they are definitely tuberculous in nature.

For a considerable time all these forms of tuberculides were considered as toxi-tuberculides, *i.e.*, lesions due to tuberculin circulating in the skin and producing, as it were, a Pirquet's reaction in certain areas, the tuberculin reaching the skin through the blood stream. But in the light of more recent knowledge we must admit that they are forms of true tuberculosis due to the actual presence of the tubercle bacillus. This brings them into line with the secondary syphilides, which are known to be due to the presence of the spirochæta pallida in the skin. Tuberculides usually disappear spontaneously or after treatment for the original focus, although in very rare cases a tuberculide has developed into Lupus vulgaris. The probable reason why they do not develop into lupus is that in such cases the tubercle bacilli are either dead or in a dying condition. As tuberculides usually occur in cases where the patient is putting up a good fight against the infection, there are sufficient antibody substances in the tissues to ensure the destruction of the bacilli in the skin.

Besides the typical erythema induratum there is another lesion, first described by Boeck as a benign sarcoid. It occurs as single or multiple hemispherical elevations of the skin, varying in size up to that of a hazel nut. These swellings are purplish in colour, and usually occur on the face or upper extremities. They persist for years and do not tend to ulcerate. Structurally they resemble very closely

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erythema induratum. Boeck obtained good results by treating these cases with arsenic internally, but Sweitzer and Michelson have tried both liq. arsenicalis and salvarsan with no result. In a small number of cases animal inoculation with pieces of the swellings has produced tuberculosis, and if the disease is really a tuberculosis the germ must be either very attenuated or dead. In addition to Boeck's sarcoid there is a deeper form described by Darier and Roussy. The disease in these cases starts as chronic indolent swellings of the hypoderm in females usually between thirty and forty years of age. The commonest situation is on the sides of the body. This condition runs the same course as Boeck's sarcoid.

The treatment of these various forms of tuberculides is not always satisfactory. With rest and general treatment the same as for all forms of tuberculosis many of them, and especially the smaller forms, disappear. For the larger lesions like erythema induratum X-rays are very useful. Tuberculin, as a rule, does not give good results. Freezing with CO₂ snow should be tried in sarcoids. Arsenic internally is also worth a trial, and Stokes strongly recommends injections of salvarsan in all forms of tuberculides, and especially in those cases where no definite focus of tuberculosis is clinically demonstrable.

In dealing with erythema induratum and sarcoids it is usual to contrast their appearances with those of erythema nodosum. In the latter disease the well-known acute tender swellings on the fronts of the legs need no description. For long these were considered to be rheumatic in origin, but here again it has been suggested of late that they also should be considered as due to tuberculosis. Marfan holds this view because erythema nodosum was present during or followed by an attack of pulmonary or general tuberculosis in more than one case. Pirquet's reaction is positive in these cases, and an exactly similar lesion to erythema nodosum can be produced by injecting a minute quantity of dilute tuberculin into the dermis. Stokes goes still further and claims that there is a tuberculous type of purpura, erythema multiforme, and erythema nodosum due to the circulation in the tissues of the tubercle bacillus or its toxins, and advocates that in these three conditions the patient should be kept under observation for some time and periodically examined for signs of tuberculosis. As intermediate cases between erythema nodosum and erythema induratum occur, Stokes thinks that it is not improbable that erythema nodosum and erythema induratum are one and the same disease, the former being the acute and the latter the chronic ulcerative form.

Lichen nitidus is a rare disease which should be mentioned on account of its possible relation to tuberculosis. The eruption consists of numerous flat-topped shining papules of practically the same colour

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as the normal skin. They commonly appear on the abdomen, breast or genitals. Microscopically they show the structure of a granuloma resembling tubercle. No tubercle bacilli have been found, and animal experiments have been negative, but several observers have noted the presence of tuberculous glands or other forms of tuberculosis in these cases. On the whole, the evidence is rather against the tuberculous theory.

Similarly another disease, granuloma annulare, has also been brought under suspicion. The lesions are raised, flat, skin-coloured or pale pink, and of the size of a large pea, the lesions enlarge, spread annularly or serpiginously, healing in the centre. They usually occur on the hands or wrists and microscopically present the structure of a granuloma rather like tubercle, but beyond that there is no further evidence of their tuberculous nature.

When tuberculides are under discussion Lupus erythematosus cannot be passed over. The controversy is still going on as to whether this condition is tuberculous or not, and in America the tendency at present seems to be to look upon it as tuberculous. In many cases there is evidence of tuberculosis of some organ other than the skin, but this does not seem to be more frequent than in persons who do not have Lupus erythematosus. In favour of Lupus erythematosus being tuberculous is the fact that Arndt in 1910 found tubercle bacilli in lesions in two cases, and Ehrmann and Reines in 1908 produced tuberculosis in the guinea-pig by inoculation of tissue from Lupus erythematosus. As it is often difficult to distinguish Lupus erythematosus from Lupus vulgaris at certain stages, the possibility of a wrong diagnosis complicates matters. In generalised Lupus erythematosus cases, some have shown at post-mortem signs of tuberculosis of the internal organs, whereas in other cases, even after careful search, no trace of tubercle was to be found. Lewandowsky, who in 1912 published an exhaustive review on Lupus erythematosus, concludes that it is a reaction of the skin to some toxine, possibly in some cases the tubercle toxine, but an unknown toxine in others.

Another disease, viz., *Pityriasis rubra* (general exfoliative dermatitis) is usually ascribed to some circulating toxine, and although in one case a universal tuberculosis of the lymphatic glands with tubercle in the skin was present, the majority of cases show no sign of tubercle. Like Lupus erythematosus, the skin eruption in pityriasis rubra is probably a reaction to some toxine, tuberculous or otherwise.

Still another condition which is suspected of being associated with tubercle is Lupus pernio. In this one sees raised purplish areas, rather like huge chilblains, but they do not break down nor ulcerate. They occur on the nose, flush areas of the cheeks, and hands. Clinically the condition is allied to Lupus erythematosus, and is very

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resistant to all forms of treatment. No direct evidence of tubercle has been found, but in most cases tuberculosis somewhere can be found or suspected.

Angiokeratoma occurs on the backs of the fingers and toes, and consists of minute purple telangiectases, with each lesion surmounted by a small horny mass. Patients with these lesions all suffer from chilblains, and at one time this condition too was put down to tubercle, but for this there are no definite grounds.

From a perusal of the above rather formidable list of conditions, either due to or suspected of being due to tuberculosis, it will be seen in what varied forms tubercle may manifest itself in the skin. Those in which the lesion has been definitely proved to be tuberculous are of great importance in directing the physician to make a thorough examination for tubercle of other organs. In those of doubtful tuberculous nature the safest plan is for the physician always to remember the possibility of tubercle, and keep a watchful eye on the case, because, although the actual skin lesion may not itself be a tuberculous one, many of these eruptions are undoubtedly commoner in individuals who are liable to tubercle, both in its milder and more serious forms.

REFERENCES.—Pollitzer, *Journ. Cutan. Dis.*, 1919, p. 81. Scheer and Lane, *ibid.*, p. 84. Hazen, *ibid.*, p. 89. Sweitzer and Michelson, *ibid.*, p. 98. Wise, *ibid.*, p. 105. Stokes, *Urolog. and Cutan. Review*, 1919, p. 232 ; *ibid.*, p. 353. Marfan, *Med. Press*, 1918, p. 6.

CLINICAL RECORD

METAL DISC IN THE ŒSOPHAGUS— ŒSOPHAGOTOMY—RECOVERY.

By R. CHARLES ALEXANDER.

CASE.—Bombardier B., Royal Field Artillery, was admitted to a Casualty Clearing Station in France, on 12th January 1918, complaining of having swallowed some hard foreign body. He stated that, while on duty near the front line in the darkness a few hours previously, he had been partaking of some "bully-beef." Owing to the fact that his artificial denture was out of order he was unable to wear it, and on that account bolted the beef, which he took directly from a tin, without chewing it. While doing so he felt something hard stick in his throat at a point near the lower part of his neck. The patient, who had come down as a sitting case, was smoking a cigarette and seemed very comfortable. He was able to drink water without difficulty, but was unable to swallow any solid food.

On examination nothing abnormal was seen in the throat or pharynx. On palpation near the lower part of the neck posterior to the trachea, there was a certain degree of tenderness. X-ray examination showed a circular, opaque foreign body rather larger than a crown piece, lying in the œsophagus with its upper end about three inches below the cricoid cartilage. This was thought to be the thin metal disc which lies under the centre of the lid in tins containing bully-beef. This disc is made of tin and has a sharp edge.

In the absence of Sir Henry Gray, the Consulting Surgeon, I asked Major John Anderson, D.S.O., to see the patient with me. He informed me that he had seen one of these metal discs lodged in the highest part of the œsophagus just below the cricoid; it had been successfully extracted under an anæsthetic by means of a coin-catcher. In the present case, however, we were agreed that such a procedure would probably cause great damage to the wall of the œsophagus from the sharp edge of the metal, and, as an œsophagoscope was not available, it was decided that the proper course was to perform œsophagotomy.

Operation.—Preparation having been made for a tracheotomy if necessary, a general anæsthetic was given by means of a Shipway apparatus. No difficulty was experienced, and when the patient was fully anæsthetised, a coin-catcher was passed beyond the disc, which was found to be firmly fixed. An oblique incision was now made on the left side of the neck low down. The sternomastoid and carotid

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sheath were drawn outwards, and the œsophagus, stretched over the foreign body, was seen. An incision was made in its wall, the disc was seized with forceps and easily withdrawn. The œsophagus was closed by means of three layers of interrupted catgut sutures. The superficial wound was closed at either end, but the centre portion was left freely open and a small roll of rubber dam was inserted down to the sutured œsophagus. The patient took the anæsthetic exceedingly well.

The patient was allowed fluids from the first. The drain was removed on the fourth day. On the sixth day there was a slight leakage of fluid from the wound when the patient was drinking; this was small in amount and caused little or no inconvenience. It ceased entirely on the eighth day and the wound rapidly closed. From the tenth day onwards the patient was able to take solid food, and he was evacuated to the base in the third week of convalescence, his wound being almost healed. A subsequent report received stated that he was perfectly well and suffered no inconvenience in swallowing.

COMMENT.—The interesting points of the case were :

1. The unusual chain of circumstances which led up to the accident, viz., the fact that the patient was unable to see the food of which he was partaking, owing to the darkness in which he was compelled to consume it, and the further fact that, in his edentulous condition, he was unable to chew it properly.

2. The almost complete absence of discomfort caused by the presence of the foreign body in the œsophagus.

3. The ease with which access was got to the œsophagus, stretched as it was by the foreign body.

4. The leakage which occurred from the œsophagus in spite of careful suture in three layers. This shows the necessity for adequate drainage in such operations.

Had the necessary instrument been available, it would probably have been preferable to pass an œsophagoscope, and, after dividing the disc, to have removed it through the tube.

I am indebted to Lieut.-Colonel M. B. Ray, D.S.O., R.A.M.C.(T), commanding No. — Casualty Clearing Station, for permission to publish the notes of this case.

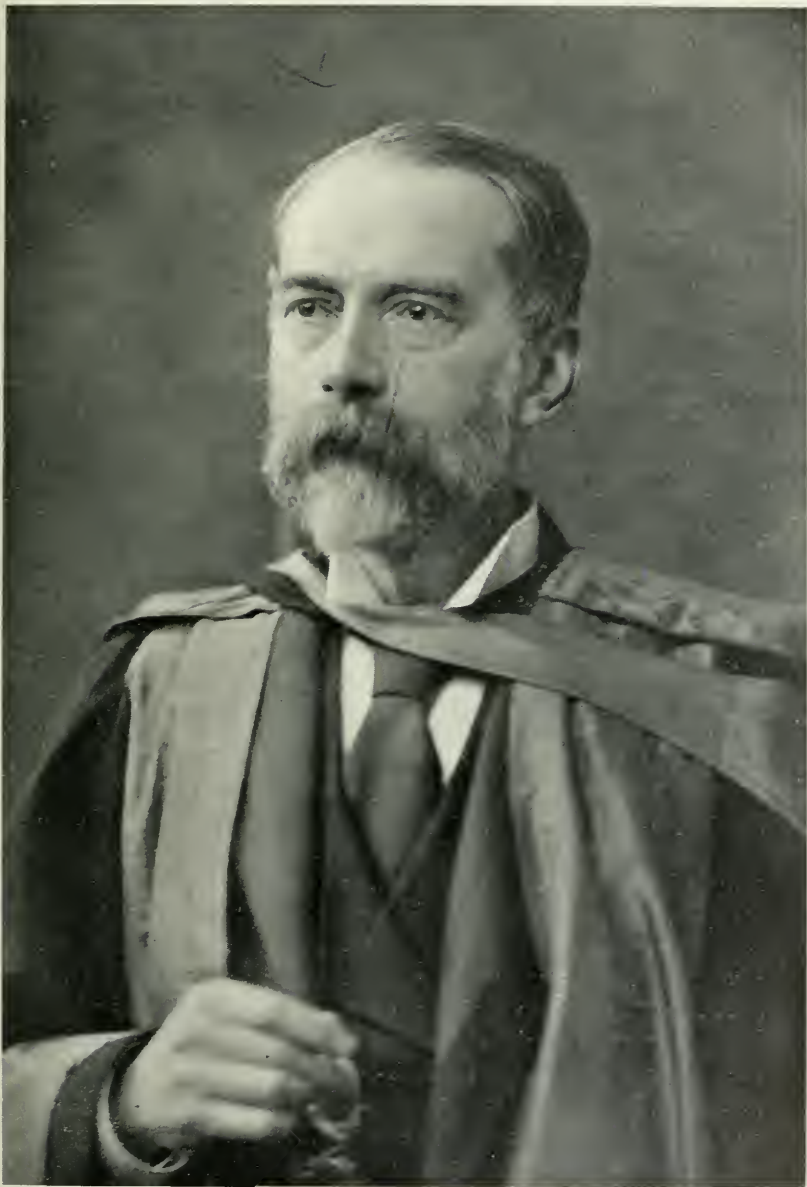
OBITUARY

SIR THOMAS R. FRASER, M.D., F.R.S.

I VALUE the privilege of being offered the opportunity of contributing some appreciation of the personality of him who was my academic chief in the first years of my post-graduate life, although I do so with considerable diffidence, as during the many years that followed I have been away from more than an occasional contact with him, and have, to my loss, never enjoyed the intimacy of his comradeship in some common public service.

When on the day of my graduation Professor Fraser did me the honour of offering me his University Assistantship, I had previously no thought of attaching myself to the subject of *materia medica*. I valued the offer, perhaps, the more that I had not been a student of his, having been a member of the last, or almost the last, class taught by the venerable Christison. My intention had been to indulge in a *Wanderjahr* after graduating, or to work in one of the Continental laboratories. Professor Fraser, however, made my acceptance of his offer possible by promising that I should be permitted in the second winter of the Assistantship to go abroad.

Our relations during the five years of my assistantship were of the most agreeable kind. I can recall only one incident that for the moment made me apprehensive of his wrath. The Department of *Materia Medica* was in those days accommodated in the old buildings. The class of practical *Materia Medica*, of which I had charge, had just been started, and space for it was not available within the *Materia Medica* rooms of Christison's time. It had to be conducted in rooms high up on the opposite side of the entrance to the quadrangle. As all my work, both in teaching and in research, was carried on in these rooms, I worked very much apart from my chief, and, as a rule, met him only in the preparations for his daily lecture. On one occasion, when he had to be absent for the day, he asked me if I would attend to the evaporation of an already reduced and partly purified macerate of the *Kombé* poison from arrow heads which were not easily got. Self-supplying water-baths were little known at the time, and being unduly engrossed with some work of my own on the other



THE LATE SIR THOMAS R. FRASER, M.D., F.R.S.

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capacity for seeing the subject from all sides and without prejudice. His peculiar fitness for administrative work as well as for scientific investigation was attested by the fact that he held almost every administrative post open to a medical professor. He was for many years Dean of the Medical Faculty, a member of the University Court, a member of the General Medical Council, and had been President of the College of Physicians. So far as an outsider can judge, he filled all these posts with marked distinction.

Perhaps one of the most notable of his characteristics was his indomitable spirit, and, without effusiveness, his buoyancy of disposition. To many of his friends his failing health, too visible for many years, seemed as if it might have denied him the power to carry on his numerous duties. But with an almost unexampled courage and grit, born of a mind that, whatever might be physically failing elsewhere, retained its full vigour and clarity almost to the last, he stood to his guns as few men have done. The frame on which his body was moulded and sustained was made of nerve rather than of bone. We have heard much in the Great War of the will to do and to win. In no one of my acquaintance was it so fully exemplified as in Sir Thomas Fraser. He suffered grievously in the war, in the early loss of a most gallant and promising son, when the submarine which he commanded sank in an unknown part and on an unknown day in the North Sea, but probably near to the enemy's coast, and still later in the loss of his son-in-law and of yet another son.

That Sir Thomas should have been able to continue at his work with failing health and amid such losses, was due not only to his own inherent courage, but also to the care of a devoted wife and family. He was fortunate in many things—in his career as a teacher and scientific worker, in the high offices which he occupied, in the many honours that came to him, but in nothing was he more happy than in his domestic relations. The gentleness and good sense and quiet charm of Lady Fraser made for me, as I feel sure for everyone else, a visit to their home a thing always to be remembered with the sincerest pleasure. The deep and sincere sympathy of her many friends is with her and her remaining family in this last of the crushing bereavements that have befallen them in these few fateful years.

MATTHEW HAY.

Obituary

When Sir Thomas Fraser commenced his investigations on the action of drugs, the methods were very different from those employed at the present time. Graphic methods were unknown, and the analysis of the action of substances by means of physiological operations on animals was practically in its infancy. It is true that Claude Bernard had already developed the methods which were to bring such distinction to the French school of physiology, and that Ludwig had begun that series of investigations which later made Leipzig a centre of physiological research, but elsewhere investigation was limited to the application of poisons to animals and simple observation of the effects. In his first papers on the Calabar bean Fraser followed the ordinary methods of the time, and throughout his work he showed little disposition to adopt the more complicated experiments which were later developed. To the end he depended mainly upon direct observation and upon simpler apparatus, such as the blood-pressure manometer and the muscle lever. It is possible that he may have been too conservative in this; on the other hand, he may have escaped erroneous interpretations by avoiding some of the later developments in mechanical registration.

His first paper was his thesis, published in 1863, and dealt with the Calabar bean, a subject obviously suggested by his teacher Christison, who was greatly interested in it. Fraser was the first to observe the contraction of the pupil under this poison, and his first investigation determined largely the direction of his future work. From the Calabar bean one line led through various other ordeal poisons and arrow poisons to his best known work on the strophanthus and acocanthera group, which occupied him during the first twenty years of his professorship. Another line of investigation originating from the Calabar bean was that dealing with the subject of antagonism in general, and in particular with that between physostigmine and atropine. Another important research appears to have been inspired largely by his colleague Crum Brown, on the relation of chemical constitution and pharmacological action. In his later years Fraser took up the subject of snake poisons and their antidotes, and was engaged on this up to the time of his death.

His most important contributions to medical science are undoubtedly those on the Calabar bean and its antagonists, those dealing with strophanthus, and the joint work with Crum

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Brown. The first forms an important part of the body of doctrine concerning antagonism and will undoubtedly stand. His work on strophanthus led to the introduction of an important remedy into medicine, and, though perhaps the virtues of strophanthus were at first exaggerated, it promises to remain as a substitute for digitalis. It is curious to observe that Fraser, who had the opportunity of working both in the laboratory and in the clinic, did little to elucidate the action of strophanthus or digitalis in disease and to reconcile its effects here with those observed in the laboratory. There seemed to be a distinct gap between his experimental and clinical activities. The same divorce between experimental investigation and practical application is to be found in the case of Ringer, who held the corresponding position in University College, London.

As regards the work on the relation of chemical constitution and pharmacological action, it has played a large part in a subject of perennial interest, and although its importance is not now as great as it was twenty years ago, it paved the way for a long series of papers by Brunton and others, and has its importance in the history of pharmacological investigation.

His latest work on snake-venoms and anti-venim followed the discovery of the antidiphtheritic serum and may have been inspired by it; but one cannot help feeling that here again there may have been a development from his earliest work on the antagonism of the alkaloids.

The whole of Fraser's researches are marked by accuracy and care. He did very much to clear up the confusion which for long prevailed in regard to the strophanthus group, and this was only possible through a combination of botanical and chemical research, for which he was admirably fitted. His work forms the link, and a very important link, in the Scottish Universities between the old *Materia Medica* of Christison and the more modern ways of dealing with the subject, and it is therefore of interest in the history of medicine, quite apart from its very great intrinsic value.

A. R. C.

REPORTS OF SOCIETIES

SCOTTISH OTOLOGICAL AND LARYNGOLOGICAL SOCIETY.

THE Society met in the Western Infirmary, Glasgow, on 13th December 1919. Dr W. T. Gardiner, President, in the Chair.

The President showed a patient with total deafness associated with vertigo. The vertigo preceded the deafness by three weeks. The deafness came on suddenly.

Dr R. P. Mathers showed an ex-soldier suffering from stenosis of the trachea following a bullet wound.

Dr A. A. Gray gave a demonstration of specimens illustrating the comparative anatomy of the membranous labyrinth.

Dr W. S. Syme showed (1) a man whose larynx he had removed nearly two years ago for malignant disease. There has been no recurrence. The man is in very good health, is regularly at work, and has developed an exceedingly good pharyngeal voice. He has also begun to smoke. (2) A man, and reported another, in whom he had performed thyrotomy for malignant disease of a cord without recurrence after $2\frac{1}{2}$ and $3\frac{1}{2}$ years. (3) A woman from whose palate he had, $4\frac{1}{2}$ years ago, removed a large mixed malignant parotid tumour. There has been no recurrence. He reported also the case of a female of 20, who died of cancer of the nasopharynx. She had been exposed to the fumes of naphtha in her work.

Dr James Adam showed (1) a woman with a growth of the hypopharynx of thirteen years' duration. It had been considered by several observers and reported by a pathologist to be malignant. It had disappeared under radium, and recurred. The recurrent growth had been reported by an experienced pathologist to be papilloma. It again disappeared under radium, and again recurred. (2) A case of a female showing Menière's symptoms. (3) A series of cases to illustrate the thesis that atrophic rhinitis is the end stage of a process beginning with hyperplasia, that it is not due to any specific microbes, that the ozoenous nose is a good culture chamber for a variety of organisms, and to raise the question whether in all cases of purulent rhinitis in children failing to respond to a few months of ordinary treatment the maxillary, like the mastoid antrum, should not be explored. This gave rise to a good deal of discussion, and it was decided to take the question up more fully at a future meeting.

Dr Kerr Love read a paper on electrical aids to hearing, based on an experiment in the case of seventy deaf children. The Acousticon was the instrument used. The children were divided into three classes,

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those with only vowel hearing, the semi-deaf, and the hard of hearing. With the first class the results were poor, with the second rather better, and with the third variable, three out of ten appearing to hear better with the Acousticon. In Dr Love's opinion the instrument will be of more value to people who have become partially deaf in adult life.

Dr J. L. Howie submitted notes of a case of cerebro-spinal rhinorrhœa whom he had shown at the previous meeting. The flow of a clear fluid in the form of a constant drip comes on at intervals, continues day and night, and stops suddenly. It is ushered in by frontal headache, slight giddiness and slight loss of memory. She is highly nervous and suffers from insomnia, but is otherwise healthy. There is no history of injury.

Dr J. W. Leitch showed a man with cicatricial changes in the pharynx which he thought to be due to former lupus. The man had never complained of his throat and had consulted Dr Leitch because of earache.

Dr Brown Kelly showed a man of 69 with pemphigus of the mouth and pharynx, who had been under observation for five years. At first the regions involved were the soft palate and uvula, the under surface of tongue, the cheek and gums of right side, lower lip, posterior pharyngeal wall, epiglottis and arytenoids. The appearances at first were:—irregular white patches of membrane, red raw areas, and, much more rarely, one or more small blisters. A few blisters have developed on various parts of the head and trunk and on the glans. Ulceration took place at the anterior nares, and these are now almost stenosed. The eyes became affected in July 1917, and by April 1918 he was blind.

Dr Napier Grant showed a man on whom he had performed intranasal dacryocystotomy with very satisfactory result.

Dr J. D. Lithgow demonstrated a model to show the planes of the semi-circular canals and the movements of the endolymph and slow component in Barany's rotation tests.

Dr H. Whitehouse showed a fatty tumour removed from the mastoid region of a girl of 15.

SCOTTISH SOCIETY OF ANÆSTHETISTS.

A MEETING of the Society was held in the hall of the Royal Faculty of Physicians and Surgeons, Glasgow, on 29th November 1919; Dr Paton Boyd, President, in the Chair.

The President referred to the lamented death of his predecessor in office, Dr D. C. A. M'Callum, of Edinburgh, which occurred in February 1915, since which time the Society had held no meeting. Dr Johnston, of Aberdeen, referred to the death in action of one of

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the members, Dr James Robertson, who fell while in command of the 2/1 Highland Field Ambulance, being killed by a shell during the heavy fighting in March 1917.

The President read his inaugural address upon *The Value of Chloroform as an Anæsthetic*. He brought the subject before the Meeting owing to the extreme attitude taken up by the American School of Anæsthetists. In the Report of the Committee on Anæsthesia of the American Medical Association, in 1912, it was stated:—(1) that the use of chloroform as an anæsthetic for major operations was no longer justifiable, owing to the danger of delayed chloroform poisoning; (2) that for minor operations also, the use of chloroform should cease, nitrous-oxide and oxygen taking its place; (3) that chloroform was sometimes convenient for inducing anæsthesia in alcoholic or other difficult subjects. While giving all credit to the American school for their valuable work, Dr Boyd considered this attitude was extreme, if not absurd. There was a period in Scotland, extending over sixty years, when chloroform was administered almost exclusively, and yet the surgical results obtained compared favourably with any country in the world. From this fact it was plain that post-operative acidosis could not be the ever-present danger suggested by the Americans. Further, there were many cases to whom it was impossible to administer ether, particularly certain abdominal cases, where the necessary relaxation could not be obtained except by chloroform. He agreed, however, that it was safer to initiate anæsthesia with nitrous-oxide and ether, or ethyl chloride and ether, and that it was really undesirable to use chloroform for short cases where nitrous-oxide and oxygen would suffice. Ready-made mixture of chloroform and ether he did not use; if he desired to exhibit both drugs together, he allowed them to mix only upon the mask. He was a believer in Levy's dictum that in giving chloroform the first principles are to keep the patient fully anæsthetised and to make the administration continuous. Above all, he considered the safety of anæsthetics depended more upon the man who was giving them than upon the exact drug or method chosen.

In the discussion which followed, the general opinion seemed to be that chloroform should not be administered unless really necessary, but that it frequently was necessary, and might then be given with very reasonable safety so long as sound principles were followed.

Dr J. S. Ross opened a discussion upon the *teaching of anæsthetics*. He pointed out that the subject of anæsthetics had in the last ten to fifteen years made great strides. New methods, such as open ether, vapour and rectal oil, ether and gas oxygen in its modern developments, and the intra-tracheal method, had all proved their value, and the whole subject of anæsthetics had been illuminated by the work of Crile upon anoci-association. The increased knowledge should lead

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to a higher general level of anæsthetising, but he was not sure that it had done so to the extent which it ought. The special anæsthetist in many schools had not been given the status necessary to enable him to influence work done in the institution which could not always be done under his own eye. As regards when and how the subject should be taught, he favoured simple lectures, given to the student as soon as he began his practical surgical work. The practical supervision of administration could not, unfortunately, always be done by a specialist. Since it seemed to be impossible that the specialist should personally teach every student, he ought to concentrate upon teaching a limited number of students very thoroughly, the students selected for this advanced training being those who were in the running for resident posts. No man should become a resident house-surgeon who had not a certificate for Advanced Anæsthetics. Since so much of the teaching was given in the surgical charges, where most of the operations were of a major nature, minor anæsthetics, *i.e.* short anæsthetics for minor operations, were not as well taught as they should be. The surgical out-patient department should be furnished with several senior students or junior residents who had had an advanced course in anæsthesia.

In the discussion the President approved of the suggestion for an advanced course of anæsthetics for future residents, which Dr Lamb stated was practically the principle followed in the Victoria Hospital, Glasgow. Drs Johnston and Ogston explained the principles upon which the work was done at Aberdeen, where, throughout the summer session, a course of lectures was given, one every week, and every student had to receive practical instruction from one of the anæsthetists to the institution. A special fee was charged to the student for this course, and the anæsthetist ranked as one of the honorary staff.

Dr Torrance Thomson reported a recent case of fatality under anæsthetic. It was a man of 68 suffering from enlarged prostate. He was given closed ether, preceded by a small dose of ethyl chloride. It was intended that the method should be changed to an open one, but owing to the perfect æration and type of anæsthesia obtained, this did not appear to be necessary. All went well until the gland had just been enucleated, when the patient died suddenly from syncope. The ordinary remedial measures were tried, without effect. So far as was known by physical examination beforehand, no abnormality of the circulation or heart could be detected. No post-mortem was made.

The President described a case which he had had that morning, an apparently healthy woman who was anæsthetised, also by closed ether, for the removal of a small section of the breast. Almost immediately after the first incision the patient gave a deep gasp and ceased breathing, the pupils dilated almost to the rim. Both he and the surgeon con-

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sidered that the case was grave, but artificial respiration restored after a few minutes. He remarked that this would be a case parallel to that of Dr Torrance Thomson, in that it was one of reflex syncope under closed ether, undoubtedly a very rare event.

Dr J. H. Gibbs mentioned an unusual case of a man aged 23 operated on for double antral disease. A preliminary dose of atropine and heroin was given, and anæsthesia induced with ethyl chloride and ether, followed by C_2E_3 from a Junker. Early in the course of operation the lobules of the patient's ears tended to be blue, and, in spite of a very free air-way and a smooth anæsthesia, the face became slightly dusky, and remained so throughout the operation, which took about one and a half hours. For the last half-hour no anæsthetic was given, and very little for some time before that. The patient was sent back to bed breathing freely, with a good pulse, but looking bluish. Two hours later the surgeon telephoned to say that the patient was still unconscious, deeply cyanosed, the lips, ears, and finger nails being almost black, without corneal reflex, breathing deeply and quickly, and with a rapid but otherwise wonderfully good pulse. Strychnine and ether had already been administered hypodermically; venesection was not indicated, there being no evidence in the veins of the neck of backward pressure. Pituitrin was injected and oxygen administered freely, and in about half-an-hour, although there was still pronounced cyanosis, there was a slight corneal reflex, and in an hour the corneal reflex was active and the patient began to roll about; cyanosis was less extreme but still pronounced. Alcohol was injected intramuscularly and soda per rectum. Patient eventually made a good recovery. The patient had been gassed in France, but apparently not badly. The lungs and urine were found to be normal, and the patient had been passed as a first-class life three months previously. A similar case had been anæsthetised the day before with ethyl chloride, ether and chloroform from the same bottles as were used in this case.

NEW BOOKS

WAR NEUROSES

1. *Psychoses of the War*. By H. C. MARR, M.D. Pp. xiv. + 292. London: Henry Frowde and Hodder & Stoughton. 1919. Price 16s. net.
2. *Shell-Shock and its Lessons*. By G. ELLIOTT SMITH, M.D., and T. H. PEAR, M.A., B.Sc. Pp. xvi. + 135. Manchester: University Press. 1919. Price 1s. 6d. net.
3. *Barbed Wire Disease*. By A. L. FISCHER, M.D., Basle. Pp. 84. London: John Bale, Sons, & Danielson, Ltd. 1919.

These three books treat of different aspects of war neuroses, and they also look at the subject from very different points of view. Dr Marr has taken the occasion to write a short text-book of psychiatry, using the case histories of military patients as texts for and illustrations of his narrative. Only on this ground can the introductory account of the physiology and anatomy of the nervous system and the signs of mental defect be justified. In a book on psychoses of the war it is natural to turn first to the chapter on neurasthenia, hysteria, and the allied psychopathies, not only because the sufferers from these far outnumber those who actually become insane in the ordinary sense, but because the war neurasthenic or hysteric is especially worthy of study. He is so, first, because under proper treatment he is curable, while if untreated or badly treated he becomes worse; and second, because the investigation of these mental states has already thrown a flood of light on psychopathology. Their comparison with analogous neuroses in civil life is a control observation on a large scale as to the correctness or otherwise of current conceptions of the neuroses.

Those who believe, with the reviewer, that the psychoses in question are due mainly, if not wholly, to psychic causes, will find little to support their opinion in Dr Marr's pages. He attaches a great deal of importance to neuropathic heredity, to the mechanical effects of high explosives, and to toxæmia, bacterial and other. Neurasthenia is discussed under the heads of: (1) simple, (2) toxic, and (3) hysterical forms. Dr Marr adopts the view that in simple neurasthenia there is a general weakness of the neurones of the association centres—"the true seat of mind and mental action"; if we understand him aright he supposes that when the neurones of the frontal area are weakened, the lower parieto-occipital and insular centres take control, acting in a purposeful though automatic manner, as is exemplified in cases of fugue or somnambulism. A similar mechanical

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conception is shown in such expressions as "the insular centre formed the idea," and in the statement that when the frontal association centre is affected insomnia results, whereas dreams result from interference with the lower centres. A great deal of prominence is given to the toxæmic factor in psychopathies (in passing it should be said that Dr Marr draws no clear line between hysteria and neurasthenia). Simple neurasthenia reduces the bodily tone generally; a shell explosion affects the sympathetic nervous system; the normal resistance of the wall of the bowel to the intestinal flora is broken down, and they or their products enter the blood. If, as is the rule (so it is stated), coliform bacilli appear in the urine, such neurasthenics do well with vaccines. Assuming, however (and the assumption is a large one), that this hypothesis is correct, surely the treatment begins at the wrong end. The primary cause being "weakness" of the neurones—the true seat of mind—ought one not to begin there; though it must be confessed that psychotherapeutics, with all its ardour, has never attempted to deal with more than mental processes, and has declined to enter the region of metaphysics in a search for their seat. It certainly appears to the reviewer that to treat neurasthenia with a vaccine obtained from the urine involves a good deal of metaphysical theory. It is difficult to understand what Dr Marr means by organic neurasthenia. Some of the cases he describes had definite signs of organic disease—*e.g.*, that on p. 112, in which there was retrobulbar neuritis and a Babinski reflex along with symptoms which may have been functional. But to call such cases neurasthenia is surely stretching the definition unduly. Most clinicians look on the existence of definite proof of organic disease as removing a case from that category. In the treatment of this group of diseases reliance is placed on general hygiene, tonics, ionic medication, electricity, massage, and so forth. Psychotherapy (which yields "good though temporary results") is said to require isolation of individual patients. Dr Marr holds that the analysis of the subconscious mind is interesting and instructive, but unnecessary in treatment.

Psychasthenia is defined as a mental state characterised by obsessions, superimposed on neurasthenia. Among the illustrative cases recorded are a dipso- and morphino-maniac, a case of suicide, a pyro-maniac, and a case (apparently) of high-grade mongolism. The collection is rather a heterogeneous one.

The chapters on mental disease proper follow conventional lines. One or two questionable statements may be noted. Mongolism is not generally thought to be related to thyroid deficiency, and there is absolutely no ground whatever for connecting it with cretinism or myxœdema (p. 153). Again, the idea that this curious error of development is a "reversion" has long been exploded, and to contrast "the

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lower physical and intellectual type of the Mongolian" is merely the race prejudice of a Caucasian.

Epilepsy in discharged soldiers offers a serious problem to Pensions Boards, and the settlement of the question, "caused" or "aggravated"? is often most difficult. Dr Marr states that of 353 cases there was a pre-war history of epilepsy or convulsions in infancy, and makes the sweeping assertion (p. 186) that with the exception of epilepsy due to head injury, trauma, or organic disease, no case of epilepsy has been directly traceable to the war. It is difficult to see how this statement can be substantiated.

Turning to Elliott Smith and Pears' little book is being removed into a different atmosphere. They approach the subject from a purely psychological standpoint, without the preconceptions of the alienist. The atmosphere is much more cheerful; one is no longer dealing with neuropaths and degenerates, one feels, but with ordinary men of healthy mentality and physique who have been broken by the stress of war. Why this has happened, how it can be cured, are set forth so clearly that readers to whom words like *katatonia* and *hebephrenia* are (literally) Greek can picture to himself pretty clearly what is believed to take place. The trained soldier, mentally and physically fit, is exposed to prolonged emotional strain; sleep is often denied him, and the usual mental and physical symptoms occur. These he must suppress—he must suppress also fear, sympathy, disgust, and many others, and all the more must he suppress these if he is in a position of responsibility and trust. He has not, in trench warfare, the emotional outlet of personal encounter. Ultimately he collapses, perhaps from a shell explosion; from that time on, the bizarre phenomena of shell-shock date, though in reality they are grounded in the antecedent emotional strain. The soldier, when he reaches hospital, has many subjective disturbances; he is irritable, changed, emotional, sleepless; he has pain, perhaps paralysis; he cannot speak, his memory fails. Now all these mental phenomena occur, he knows, in mental disease. He rationalises them, and concludes he is going mad, or something like it. The longer he broods on them, the more they become integrated with his personality, the more difficult does analysis become. That, in short, is a brief outline of a typical case of shell-shock, and when it is looked at in this way it is apparent why energetic treatment early, in front-line hospitals (as was practised in some parts of the front), was so much more successful than treatment at the base a few weeks later. It is also right that the authors should emphasise, as they do, that such symptoms are not "funk," but occur in men whose courage is beyond dispute, and in seasoned officers, N.C.O.'s, and men of the "old contemptibles." In treating these disorders the authors depend wholly on psychical methods, which are discussed at length. The place of

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sympathy, of firmness, of isolation, of suggestion, of hypnotism, is considered, and it is shown that often no very penetrating analysis is needed to remove the causal emotional factor, and this being done the cure can often be effected by explaining the rationale of his symptoms to the patient. Should a case resist these measures psycho-analysis is required. In dealing with this subject the authors discuss the various objections to the method—first that of those who consider any dealings with the unconscious as mere whimsies and fads, and second that of the critics who oppose exploration of the unconscious on æsthetic, social, and moral grounds. They state their case uncommonly well—it is as good an *apologia* for psycho-analysis as could be desired. The last chapters of the book have wider applications than the rest. Primarily, the writers are interested in war neuroses; ultimately they appeal for an extension to the civil community of the advantages which the “shell-shock” soldier enjoys. What are these advantages? Early recognition and intelligent treatment of his disease, institutional treatment in special hospitals, and the relegation of asylum detention to the last resort. When one compares the facilities the army afforded for the cure of psychoses with what are available in civil life, the answer to the question heading Chapter V., “Are we as a nation doing all that we should for the mentally affected?” is, unfortunately, in the negative. And apart from the absence of institutional and dispensary facilities for neurasthenia and border-line cases, another unfavourable factor appears in civil practice which did not obtain in the army—that is, the lack of hopefulness in dealing with the former. In the army, everybody felt assured that the disorders in question were, in the main, curable. Thus from the outset an atmosphere was produced which favoured recovery. It is now required to apply the lesson to civil life, to realise that neurasthenics can be cured, the more easily the earlier they are taken in hand, and not, as we now do, to delay the necessary action until patients become hopelessly ill, and then consign them to palatial asylums, even though those be renamed “mental hospitals.”

To one special war psychosis a special name applies—“Barbed wire disease”—“*Stacheldraht Krankheit*”—the malady of unutterable, unspeakable boredom, which befalls nearly all prisoners of war. While neurasthenia and hysteria are admittedly rare among prisoners of war, the majority of them after six or eight months develop nervous symptoms, of which apathy, irritability, brain fag, failure of memory, and depression, are the chief symptoms. Among the chief causes of these are, in addition to the natural misery arising from loss of freedom, the complete absence of any privacy, and the unsatisfied craving for solitude engendered thereby, the unproductive character of the work enforced—in many instances, at least, the prolonged association with

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the same persons, which produces what is vulgarly known as "getting on one's nerves," and, to a less extent, the enforced sexual abstinence. Dr Fischer points out that a similar train of symptoms is apt to develop under analogous conditions—*e.g.*, in arctic exploration where a party is cut off from the world for months. Dr S. A. K. Wilson has contributed an interesting introductory chapter, and an anonymous "X." furnishes personal notes on captivity from an Englishman's point of view. A good many camp journals and magazines have been laid under contribution to furnish illustrations of internment camp psychology, and altogether this little volume is an interesting contribution to quasi-medical war literature.

BOOKS RECEIVED.

BALLANTYNE, J. W., edited by. <i>Encyclopædia Medica</i> . Vol. VI. HE-IN. Second Edition	(<i>Wm. Green & Son, Ltd.</i>)	—
BOWEN, WILBUR PARDON. <i>Applied Anatomy and Kinesiology</i> . Second Edition	(<i>Lea & Febiger</i>)	\$3.50
BROWN, CHARLOTTE A. <i>The Principles of Nursing</i>	(<i>Lea & Febiger</i>)	\$1.75
BROWN, LAWRASON. <i>Rules for Recovery from Tuberculosis</i> . Third Edition	(<i>Lea & Febiger</i>)	\$1.50
CAMERON, SAMUEL J. <i>A Manual of Gynæcology</i> . Second Edition	(<i>Edward Arnold</i>)	25s.
COMYNS, BERKELEY, and BONNEY, VICTOR. <i>A Guide to Gynæcology in General Practice</i> . Second Edition	(<i>Henry Frowde & Hodder & Stoughton</i>)	31s. 6d
EGBERT, SENECA. <i>A Manual of Hygiene and Sanitation</i> . Seventh Edition	(<i>Lea & Febiger</i>)	\$3
FISHBERG, MAURICE. <i>Pulmonary Tuberculosis</i> . Second Edition	(<i>Lea & Febiger</i>)	—
GAGE, HAROLD C. <i>X-Ray Observations for Foreign Bodies and their Localisation</i>	(<i>Wm. Heinemann (Medical Books), Ltd.</i>)	6s.
GARDINER, J. STANLEY and BORRADAILE, L. A., edited by. <i>The Cambridge Notebook for Practical Biology</i> . Sixth Edition	(<i>Henry Frowde & Hodder & Stoughton</i>)	5s.
IOWA UNIVERSITY. <i>Collected Studies and Reports</i> . Vol. Q, No. 5. <i>Studies in Medicine</i>	(<i>Lea & Febiger</i>)	\$0.40
M'GUIGAN, HUGH. <i>Experimental Pharmacology</i>	(<i>Lea & Febiger</i>)	\$2.75
MUMMERY, J. HOWARD. <i>Microscopic Anatomy of the Teeth</i>	(<i>Henry Frowde & Hodder & Stoughton</i>)	25s.
PORTER, W. G. <i>Diseases of the Throat, Nose, and Ear</i> . Third Edition	(<i>John Wright & Sons, Ltd.</i>)	12s. 6d.
PRICE, GEORGE W. <i>Hygiene and Public Health</i> . Second Edition	(<i>Lea & Febiger</i>)	\$1.50
PROCEEDINGS of the Pathological Society of Philadelphia, 1918-19. New Series, Vol. XXI.	(<i>Wm. J. Dornan</i>)	—
REPORTS of the Johns Hopkins Hospital. Vol. XVIII.	(<i>The Johns Hopkins Press</i>)	—
SCHOFIELD, A. T. <i>Modern Spiritism</i>	(<i>J. & A. Churchill</i>)	3s. 6d.
SUTTON, RICHARD L. <i>Diseases of the Skin</i> . Third Edition	(<i>Henry Kimpton</i>)	42s.
TILLEY, HERBERT. <i>Diseases of the Nose and Throat</i> . Fourth Edition	(<i>H. K. Lewis & Co., Ltd.</i>)	25s.
TRANSACTIONS of the American Surgical Association. Vol. XXVI., 1928	(<i>Wm. J. Dornan</i>)	—
WERNER, LOUIS, edited by. <i>Swanzy's Handbook of the Diseases of the Eye</i> . Twelfth Edition	(<i>H. K. Lewis & Co., Ltd.</i>)	22s. 6d.
WILSON, R. M. and W. M. T. <i>War Diseases and Pensions</i>	(<i>Henry Frowde & Hodder & Stoughton</i>)	3s. 6d.

Edinburgh Medical Journal

March 1920

EDITORIAL NOTES

THE class of medical journal, commonly known as the *Centralblatt*, has "Medical Science," never flourished in this country—there is, indeed, no generic name for it, nor any equivalent for the German word. In many ways this has been a handicap to British research, and the fact that the chief indexes of medical literature have hitherto been of foreign origin has rather tended to obscure the value and importance of native work. It is therefore a duty, as well as a pleasure, to commend the new magazine, *Medical Science*, published for the Medical Research Committee by Humphrey Milford at the Oxford University Press, which promises to fill a real gap in our medical literature. If, as the very strong Editorial Committee gives us every reason to anticipate that it will, the journal maintains the high standard and interest of the first four numbers, its success is ensured. Each number contains both critical reviews and short abstracts, about two-thirds of the space going to the former. The get-up of the journal is excellent, and the price extremely moderate.

A QUARTERLY meeting of the Royal College of Physicians of Edinburgh was held on 3rd February 1920, the President, Sir Robert Philip, in the chair. The following were elected Fellows of the College:—Leo Ferdinando Bianchi, L.R.C.P.E., and William Hughes, M.B. The following were admitted to the Membership of the College:—Disney Hubert Dusch Cran, M.D., Peter Cousin Davie, M.B., Herbert Calder Elder, M.B., Duncan Cook, M.B., and Eric Wilfred Frecker, M.B. Licences to practise were granted (in conjunction with the associated bodies) to eleven candidates who had fulfilled the conditions and passed the final examination.

M. Eleutherios Venizelos, Prime Minister of Greece, was elected an Honorary Fellow of the College. The President announced that the Supplementary Royal Charter, dated 3rd December 1919, had now been delivered and was placed on the table of the College. The Supplementary Charter empowered the College to admit women to the Membership and Fellowship of the College on the same conditions and with the same privileges as men. Sir Robert Philip was appointed a Trustee of the College.

THE TREATMENT OF FRACTURE OF THE MANDIBLE

By WILLIAM GUY, F.R.C.S., L.D.S.Ed.

LUCAS CHAMPIONNIÈRE in the Introduction to his classic, *Traitement des Fractures par le Massage*, says:—"La thérapeutique des fractures, dans la chirurgie moderne est à peu près exclusivement constituée par les soins de l'immobilisation." This observation applies with especial force to the generally practised methods of treatment of fracture of the mandible—indeed I think there is no fracture on which there has descended with greater malignity what my friend Mr Dowden calls "the Curse of Immobilisation." That immobilisation of these fractures is the authoritative teaching might be shown by many quotations from text-books and monographs; let one, however, suffice. Blair in *Surgery of the Mouth and Jaws*, 1913, states: "Wiring the lower to upper jaw, either by the teeth, or by a wire passed around the lower jaw and fastened to the upper teeth, and, when necessary, wiring the bones directly, are the only plans of treatment that we now resort to in the treatment of fractures of the lower jaw." The war afforded opportunities to surgeons and dentists for the treatment of this particular injury in numbers unprecedented. Men saw and treated in a single fortnight more cases than in civil practice they could have hoped to see in a lifetime. Extraordinary ingenuity was displayed in the devising of apparatus of immobilisation. Controversy raged around the question of the relative merits of immobilisation of the jaws in the "closed" or the "open bite" position. Far be it from me to belittle the results that were obtained, or to throw a damper on the satisfaction with which they were viewed; the object of this paper is to show that I stand by Lucas Championnière, that I accept his principles and practice of which he himself says: "Les principes que j'y expose et les pratiques que je conseille sont contraires presque partout aux idées très généralement acceptées et aux enseignements de la chirurgie régulière," and to maintain that in the vast majority of cases of fractured mandible, immobilisation is not only not necessary, but inadvisable, or even prejudicial to a successful issue.

The aim of treatment should be re-establishment of function

Treatment of Fracture of the Mandible

at the earliest possible moment. It is of importance that the fracture should at the termination of treatment be united, it is of still greater importance that the patient should have a lower jaw which is functional, which, in short, he can use. Immobilisation in many instances defeats the attainment of this result. I have seen too many cases in which by immobilisation union in excellent position and perfect occlusion of the teeth had been obtained, but the patient could only separate the front teeth about a quarter of an inch, the temporo-mandibular joint merely permitting an extremely limited range of movement while owing to muscular atrophy and stiffness from long disuse, masticatory power was practically non-existent. Such cases require a long course of gradual opening of the bite, re-education of muscles, massage and electrical stimulation in order partially to restore the lost function. It will be argued that immobilisation is necessary to prevent displacement of the fragments by muscular action. Mr Dowden says that to ignore the action of muscles as a distorting agent is regarded by surgeons as a horrible heresy. If it be so, I am another horrible heretic, for I prefer to believe that the main thing is to encourage and assist the patient to correct displacement. In this the muscles directed by the will are the effective factors, and the correct position once obtained is, provided movement has been permitted from the first, generally maintained without assistance. I do not wish it to be inferred that no treatment whatever apart from mobilisation is required, the fragments must be coapted, and coaptation in most instances maintained by mechanical support of some kind, *i.e.*, by an intra-oral frame or splint. The questions arise, what are the conditions calling for such a splint and what is the best kind of splint to use? Fractures of the ascending ramus require no splint, the bone, embedded in the muscular mass of masseter and pterygoids, can dispense with extraneous retention. Fractures of the condyloid process or coronoid process are likewise independent of splints. Fractures of the body of the bone remain. With a fracture of the body on one side, the major fragment swings to the injured side, the minor fragment is tilted inwards and drawn upwards. In bilateral fracture the central fragment drops downwards and backwards. For fractures of the body of the mandible the treatment I advocate is the employment of a single piece intra-oral splint with an aluminium chin-piece or sling externally, to afford comfortable rest and support. The patient must be

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encouraged to use the jaw, and instructed that it is his business, or in modern parlance that it is "up to him" so to educate his muscles as to secure occlusion in the correct position. So far I shall have the assent of many of my colleagues, but I fear they will part company when I say that the intra-oral splint should not be fixed to the teeth. For example, Martinier and Lemerle state that "there is one *sine qua non* of success, the absolute fixation of the splint." It must, however, be apparent that the absolute fixation of the splint does immobilise the fragments absolutely and so prevents the very slight degree of movement which I believe to be provocative of activity in the reparation process. The Hammond wire splint is described in all the text-books, it is unhygienic, not easy to adapt or to fix; personally I have no use for it, nor have I for the Kingsley, Gunning, or Hayward splints, or in the treatment of fracture for any form of fixed interdental splint.

The splint now in common use is a metal one-piece splint either struck or cast, fitting over the teeth either completely or allowing the occlusal surfaces to come through, and cemented into place with dental cement. The splint I use is a loosely-fitting frame surrounding but not enveloping the teeth, and is cast in silver. It merely lies in the mouth and can be removed in a moment for cleaning, or for examination and treatment of the mouth or teeth. Its function is to prevent vicious movement of the fragments. Fig. 1 shows examples of this appliance. Figs. 2 and 3 show it in position on a model of the lower jaw and teeth. It has three great advantages, it is clean, comfortable, and efficient. The fixed trough splint may share two of these advantages, but I have removed a good many and never found one yet that did not stink.

The chin-piece or sling is made of aluminium and affords support. Gentle upward pressure may be advisable in the earlier stages; this is effected by providing sliding catches at the sides joined by a rubber band running between them on the outer and lower side of the chin-piece. Tapes attached to the catches are tied over the vertex, and graduated elastic pressure is thus obtained. This chin-piece is particularly useful in bilateral fractures, in these its use is continued till union occurs.

To obtain the cast on which the frame or "atelle" is moulded, it is necessary to get an accurate impression of the lower jaw and teeth with the fragments in good position.

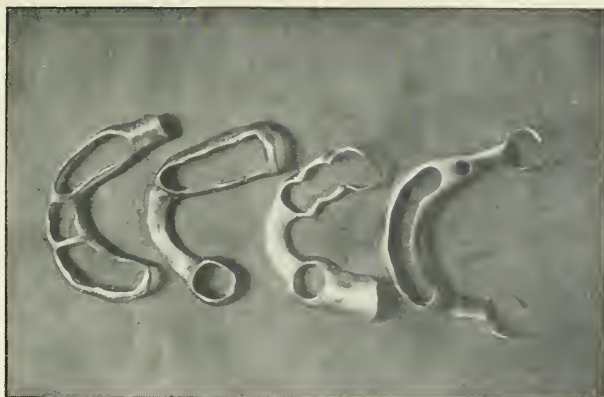


FIG. 1.—“Frame ” or “atelle ” splints.



FIG. 2.—“Frame ” in position.

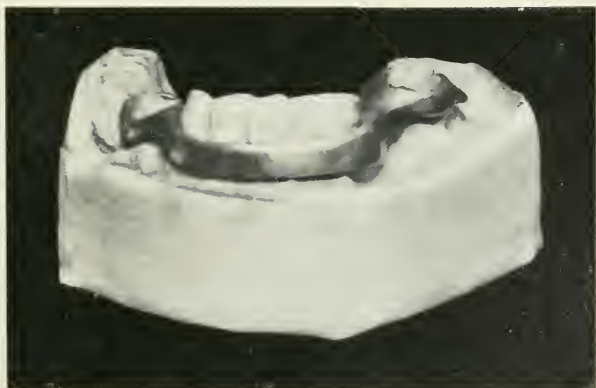


FIG. 3.—“Frame ” in position.

Treatment of Fracture of the Mandible

The text-book method is to take an impression without attempting to correct the position, to saw through the plaster model, and to reduce the displacement on the model by placing the parts in exact articulation with a model of the upper jaw. I find it a comparatively easy and more satisfactory procedure to take an impression of the lower jaw with the fragments in the correct position. An assistant maintains them in position by means of ligatures thrown round the teeth, aided by digital pressure and support. This method is identical with that recently described by the French writers Roy and Vilain, but it has been practised and taught by me for over twenty years. On the model from this impression the "atelle" is modelled in wax, taking care to have a loose fit, and is then cast in silver by the vacuum-casting process.

Massage is the most valuable supplementary treatment we have in dealing with these injuries.

It may be said in criticism of the methods I advocate, that admitting their suitability for such fractures as are commonly met with in civil practice, they will not be applicable to the severe type of injury caused by gunshot wound and accompanied by extensive external wounds, fracture of teeth, and destruction both of bone and soft parts. I believe, however, with my mentor Lucas Championnière, that the dictum that movement is necessary for the successful treatment of fractures is even more applicable to compound than to simple fractures, and acting on these principles I have treated over four hundred fractures of the mandible caused by gunshot wound, of every degree of severity. In the result I am confirmed in my conviction that "*Le mouvement c'est la vie.*"

Per contra, I believe that long-continued immobilisation results in stiffness and limitation of movement of the temporo-mandibular joint, causes atrophy of muscles, is a condition favourable to the continuance of sepsis and the extension thereof, so also to necrosis of bone and infiltration of soft parts, while at the same time it is unfavourable to the formation of callus.

TRANSFUSION OF BLOOD IN CASES OF HÆMORRHAGE.

By JAMES M. GRAHAM, Ch.M., F.R.C.S., Assistant Surgeon,
Royal Infirmary.

ONE of the first effects of hæmorrhage is to cause a lowering of blood-pressure in proportion to the amount and rate of loss of blood. When the hæmorrhage is not immediately fatal and the bleeding is arrested there is a tendency, as the tone of the vessels recovers and the volume of the blood is increased by the body fluids, for the blood-pressure gradually to rise again. Death may be due to loss of corpuscles but may equally well result from continuance of low blood-pressure. Bayliss has pointed out that a diluted blood at moderate pressure is much more efficient for maintaining the vitality of the tissues and organs than a concentrated blood at low pressure.

It is important, therefore, in all cases where the patient is reduced to a dangerous condition by loss of blood, to increase the amount of fluid circulating in the vessels. The question then arises as to what solution is best adapted to form a substitute for the lost blood. In cases of exsanguination my experience indicates the superior value of homologous blood over other solutions. The value of transfusion in cases of hæmorrhage was impressed upon me in the first instance by experimental work carried out before the opportunity had occurred of employing this method of treatment clinically.

The following brief note of an experiment shows how an animal rendered moribund by hæmorrhage can be restored by transfusion.

EXPERIMENT I. — 20th Nov. 1913.—Donor — dog, 13.5 kilos. Recipient—dog, 7.2 kilos. The operation was performed with aseptic precautions under general anæsthesia. A paraffined glass canula was used for the transfusion from carotid artery to external jugular vein. Approximately half of the recipient's blood was withdrawn by repeated bleedings from the femoral artery. The blood-pressure, observed on a continuous tracing taken from the carotid artery, fell from 151 mm. to 41 mm. of mercury. Transfusion was commenced when the animal was *in extremis*. The following figures show the effect of bleeding and of transfusion upon the blood-pressure:—

	Blood-pressure.
Before Bleeding	151 mm.
After Bleeding, 100 c.c.	114 „

Transfusion of Blood in Hæmorrhage

	Blood Pressure.
After Bleeding, 150 c.c.	105 mm.
„ „ 210 „	84 „
„ „ 250 „	52 „
Continued fall to	41 „
After transfusion for one minute	151 „
After transfusion for three minutes	190 „

The blood-pressure was readily restored by transfusion to its normal level and was still further raised by over-transfusion. The wounds were sutured and the animal made an excellent recovery.

In a similar experiment the effects of intravenous infusion of normal saline upon the blood-pressure were noted.

EXPERIMENT II.—*27th Nov. 1913.*—Dog—10.35 kilos. The experiment was performed under general anæsthesia. Blood was withdrawn from the femoral artery and equivalent amounts of saline were infused into the jugular vein. The following figures show the changes in the blood-pressure produced by hæmorrhage and infusion of saline:—

	Blood-pressure.
Before Bleeding	120 mm.
After withdrawal of 310 c.c. of blood	75 „
Gradual rise within 8 minutes to	88 „
After infusion of 310 c.c. of saline	120 „
After further withdrawal of 200 c.c. of blood	90 „
After infusion of 200 c.c. of saline	118 „
Gradual fall within 8 minutes to	100 „
After further withdrawal of 60 c.c. of blood	80 „
After further infusion of 60 c.c. of saline	74 „
Gradual fall to	47 „

Further infusion of saline, in excess of the amount of blood withdrawn, failed to raise the blood-pressure or to prevent death.

The experiment shows that a marked fall in blood-pressure follows immediately on profuse hæmorrhage, but that the pressure gradually rises again although it remains considerably below normal. Infusion of the same amount of saline will at first restore the pressure to the same level as before the hæmorrhage. After subsequent hæmorrhages infusion of saline will restore the pressure almost to normal, but the effect is only temporary. A stage of depletion is reached at which the pressure steadily falls and the volume of fluid within the vessels is diminished in spite of the replacement of the blood by saline. When hæmorrhage is excessive, infusion of normal saline fails to keep the blood-pressure at a level necessary to maintain life, and also fails to replace the lost corpuscles.

A further experiment may be quoted to show that transfusion

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is successful in reanimating an animal after hæmorrhage when infusion of saline has failed to maintain the blood-pressure at a level compatible with life.

EXPERIMENT III.—16th Dec. 1913. — Donor — Dog, 15 kilos. Recipient — Dog, 8.25 kilos. The experiment was designed in order to compare the effects of infusion of saline and transfusion of blood on the blood-pressure, and as a means of treatment in cases of profuse hæmorrhage.

At the commencement of the experiment the recipient's blood-pressure, taken from the carotid artery, was 140 mm. The animal was repeatedly bled and the blood lost was replaced by equal amounts of saline solution. By this method of alternate bleeding and infusion of saline it is possible to withdraw the maximum amount of blood. The method of withdrawing the blood at intervals permits also a more gradual and more complete depletion of the animal. After eight successive bleedings followed on each occasion by injection of the same amount of saline the animal was reduced to an extreme degree of exsanguination. Respiration was embarrassed through deficient oxygenation and the blood-pressure was reduced to 28 mm. The animal at this stage was moribund and it took 3 minutes, 10 seconds to withdraw 35 c.c. of blood, about one-sixteenth of the volume which would have been delivered at the commencement of the experiment. This gradual withdrawal of a further amount of blood reduced the pressure to 22 mm. Further infusion of saline failed to raise the blood-pressure, and as the animal could not longer be maintained alive, it was decided to try the effects of transfusion. From the commencement of the transfusion the blood-pressure steadily rose till it reached 130 mm., in three minutes time, when the transfusion was stopped.

The blood-pressure thus restored was maintained at this level for several minutes, and accordingly the animal was again bled to the extent of 200 c.c. This further loss of blood caused the pressure to fall to 90 mm., but after a second transfusion it again rose to 120 mm. and the experiment was concluded. The recipient's wounds were closed, after ligation of the vessels, and the animal made an excellent recovery. The donor was killed.

Further experiments showed that an animal infused with saline after a moderate hæmorrhage makes a more gradual recovery after the operation than an animal which has been transfused with blood after excessive hæmorrhage.

The duration of the anæmia in my experiments, examples of which are quoted above, did not exceed seventy-five minutes, and the rapid restoration and the maintenance of the blood-pressure by transfusion showed that the vaso-motor centre and

Transfusion of Blood in Hæmorrhage

the heart muscle were not injuriously affected. By raising the blood-pressure mechanically after severe hæmorrhage and by replacing the lost corpuscles, transfusion will succeed in saving life when saline has failed to do so.

My clinical observations in cases of hæmorrhage or of hæmorrhage combined with shock have fully confirmed the advantages of transfusion indicated by the experimental work.

The following immediate signs of benefit following transfusion may be noted in cases of hæmorrhage or of profound anæmia from other causes.

1. *Colour*.—One of the first results of transfusion is the appearance of colour in the patient's face in the form of a slight capillary flush. The improvement in colour usually appears first in the lobes of the ears or on the cheeks, and is generally noticed, both in the skin and mucous membranes, within five minutes after the commencement of the transfusion. The fresh colour in the patient's complexion, at first scarcely perceptible, soon becomes obvious, and the pallid or waxy skin may finally assume a healthy pink colour; but this, of course, will depend on the amount of blood transfused. At the conclusion of the operation the patient's colour frequently suggests a richer blood than is shown by the hæmoglobin count and the improvement in colour may be less pronounced later. As the colour improves the face seems to fill out, losing its pinched and sunken look, and, at the end of the operation, it is not unusual for the appearance of the donor to suffer in contrast with that of the patient.

2. *Mental*.—Nothing can be more striking than the effect of transfusion on the patient's cerebral functions, especially when he is unconscious at the commencement of the transfusion. My cases have often been lifted on to the operating table in a more or less comatose condition, and have awakened during the transfusion to a knowledge of what was going on. Even as small an amount of fresh blood as 200 c.c. may suffice to restore consciousness. With returning consciousness the patient takes an interest in the proceedings and soon begins to understand and answer questions. Occasionally such cases take a lively part in the conversation and actually appear exhilarated. The circumstances are more dramatic when the patient and donor are in close contact than when the blood is simply introduced through a funnel and tubing, and the patient is ignorant of the nature

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of the treatment. Even when the patient is not unconscious, he is usually dull and apathetic and often oblivious to his surroundings. In such cases the improvement in the mental condition is also striking.

The relief of symptoms shows itself in different ways. As a rule the patient states that he feels better and stronger at the conclusion of the transfusion. Various symptoms may be mitigated, such as numbness and tingling of the limbs, and impaired vision; and the annoyance of audible pulsation may be removed. One patient stated that the main difference she noted was a sensation of warmth and comfort, lacking before.

Many semi-conscious patients are restless, and their uncontrolled movements are apt to interfere with the operation. Such movements may be due to air hunger or simply to the fractious or irritable condition of the patient; these cases usually become quiet and placid as the transfusion takes effect.

3. *Changes in the Pulse.*—The pulse is usually rapid, and may be either very small or imperceptible at the wrist. In some cases of hæmorrhage the pulse rate may be 150 or 160 per minute. The strength of the pulse increases *pari passu* with the improvement in the patient's colour, and as the vessels become filled the heart itself contracts more strongly. It is not unusual for the pulse at the conclusion of the transfusion to be diminished from 150 to 120 per minute. Improvement in the pulse rate is more marked in cases of profound anæmia from recent hæmorrhage than in cases of chronic anæmia. The increasing facility with which blood for hæmoglobin estimation can be obtained by pricking the ear is a further sign of the improved condition of the circulation; and, if an operation is in progress during the transfusion, the tissues will be found to bleed more freely in proportion to the amount of blood transfused.

4. *Blood-pressure.*—A distinct change is noticed in the blood-pressure, particularly in cases of primary or secondary hæmorrhage. In most of the cases requiring transfusion the blood-pressure is low, generally below 100 mm. and often 70 mm. or less. The increase of pressure may be as much as from 50 to 60 mm. to 90 or 100 mm. or more; shortly after transfusion the blood-pressure may return almost to the normal level. The combination of a rise in blood pressure and a fall in pulse rate is characteristic of a successful trans-

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fusion in cases of hæmorrhage. The rise in the blood-pressure naturally varies with the amount of blood introduced, and if an over-transfusion is given, the pressure may rise to a remarkable degree, as shown by experimental work.

5. *Respiration.*—The respirations are apt to be fast and laboured if the patient is suffering from air hunger. The signs of deficient oxidation gradually diminish or disappear as the donor's corpuscles increase the oxygen-carrying capacity of the blood. Cases gasping for breath, so much so that it is difficult to keep them still, may be completely relieved of their respiratory embarrassment during the course of the transfusion, the respirations falling from 50 to less than 30 per minute.

6. *Increase in the Hæmoglobin percentage, and in the Red Corpuscle Count per Cubic Millimetre.*—Repeated examinations of the hæmoglobin were made during transfusion in the great majority of my cases, the only exceptions being in cases where there was no assistance available.

The average increase in the hæmoglobin count, taken from a series of pernicious anæmia cases which were completely observed, was 19 per cent. The greatest increase noted was in one case where the hæmoglobin was raised from 28 to 73 per cent., an increase of 45 per cent.

The average increase in red corpuscles in the same cases was about one million per cubic millimetre, so that the hæmoglobin and corpuscles were increased by transfusion in the same proportion.

The actual risks associated with transfusion of blood in cases of anæmia from hæmorrhage are so slight that they need not be regarded, when preliminary tests have excluded the dangers of agglutination and hæmolysis. With rare exceptions the transfused blood acts as a grafted tissue, and the corpuscles are at once available in the recipient's blood for performing their physiological function. The serum of the blood also plays an important part in compensating for the volume of fluid lost by hæmorrhage.

There has been no evidence of hæmolysis or of destruction of the corpuscles in any of my cases of primary or secondary hæmorrhage treated by transfusion. The corpuscles appeared to functionate exactly like those of the recipient, and presumably their duration in the recipient's blood is that which is normal to the individual patient.

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The great advantages of blood transfusion compared with infusion of normal saline or other artificial solutions are :— (1) The blood-pressure is immediately raised ; (2) The blood-pressure is likely to be maintained ; (3) The oxygen-carrying capacity of the blood is increased.

Naturally one would not recommend transfusion as a routine treatment for loss of blood. It is remarkable how completely and even quickly an individual can recover from loss of blood without special treatment, but there still remain numerous cases where the patient dies from the effects of sudden or prolonged hæmorrhage in spite of all treatment, including the usual injections of saline, intravenously or otherwise. My experiments showed that a stage of depletion could be reached, beyond which intravenous injection of saline or Locke's fluid failed to produce any permanent or even temporary response, and which was not compatible with life. Similar cases may be seen in practice, uncomplicated by shock or toxæmia, where collapse from hæmorrhage may be so great that the patient's death is inevitable within a few hours. Apart from extreme cases, where death is obviously imminent, it is impossible to lay down any definite rule as to when transfusion is indicated. In traumatic or operation cases the degree of shock present should be taken into consideration, and anti-shock treatment employed in the first instance, if the blood loss has been slight. When, however, the hæmorrhage has been considerable, and the patient's condition is critical, transfusion should be preferred.

In recent cases of hæmorrhage hæmoglobin estimations and blood counts are not of much assistance. The best indication for transfusion is the presence of signs of serious collapse, such as pallor, subnormal temperature, a small fast pulse with low blood-pressure, restlessness, sighing and rapid respirations, syncope or other symptoms of deficient oxygenation. The syncope and collapse which follow a sudden profuse hæmorrhage frequently yield rapidly to simple measures, such as raising the foot of the bed and administering fluids ; the pulse may be imperceptible only for a few minutes, and quickly recovers its tone and quality. If each case, therefore, is considered on its own merits, transfusion will not be employed unnecessarily. In doubtful cases the blood-pressure is the most valuable index of the gravity of the case. Continuance of collapse and a rapidly falling blood-pressure, when the

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hæmorrhage is controlled, are signs of serious significance, and strongly suggest the necessity for transfusion, particularly when saline infusions and other measures have been tried.

According to Bruce Robertson,¹ the patient's condition is precarious if the blood-pressure is below 70 mm. and when it is below 90 mm. the patient is a bad subject for operation. My own observations confirm these views regarding the significance and dangers of low blood-pressure in cases of hæmorrhage.

The following cases may be quoted to show the effect of transfusion in critical cases of hæmorrhage. Cases I., II., and III. were examples of primary hæmorrhage uncomplicated by shock or sepsis. Cases IV., V., and VI. were examples of secondary hæmorrhage uncomplicated by shock.

CASE. I.—*Melæna neonatorum*. Beatrice B., aged 10 hours. This case was under the care of the late Mr Scott Carmichael. The child was passing blood per rectum and was profoundly anæmic, cold, and collapsed. Direct transfusion of blood was performed, as the case seemed hopeless and death appeared to be imminent. The father acted as donor, the radial artery being connected to the femoral vein by a silver cannula. The effect of the transfusion was immediate. Within a minute the child became rosy, and began to struggle and cry vigorously, in striking contrast to its previous limp and moribund condition. Its pulse during the transfusion was identical in rate with the father's. The recovery was immediate and permanent, and there was no further hæmorrhage from the bowel.

CASE II.—Mr M., aged 51. Gastric hæmorrhage. 26th December 1918. The cause of the hæmorrhage in this case was uncertain. For several years the patient had been drinking to excess and suffered from chronic gastritis. He had during the previous year noticed tarry material in the stools, and on a former occasion had collapsed from gastric hæmorrhage and required subcutaneous salines.

On 23rd December 1918 the patient again suffered from profuse hæmorrhage from the bowel. It was reckoned that six pints of blood were passed in two days' time, and in addition there was a great deal of blood vomited.

On 26th December 1918 the patient collapsed completely. He was now blanched, cold, clammy, pulseless, restless, and gasping for air, and had lapsed into a semi-conscious condition. Transfusion of blood was advised by Professor Gulland, and this was carried out immediately. 700 c.c. of citrated blood were collected from a convalescent soldier, previously tested and known to be a group IV. donor, and transported to the patient's house. During the transfusion

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the colour improved, the pulse became palpable, the blood-pressure was considerably raised, and complete consciousness was regained. The greatest change noted was in the relief from air hunger, the patient becoming quiet and breathing easily before the transfusion was completed. No further bleeding occurred after the transfusion and the patient made a gradual but steady recovery.

CASE III.—Mr F., aged 49. Hæmorrhage following gastro-enterostomy. 11th January 1919. The patient vomited a large quantity of coffee-ground material a few hours after gastro-enterostomy had been performed for duodenal ulcer. He was kept under the influence of morphia, but the bleeding continued. On the day following operation he was feeble, collapsed, and occasionally sick. Thirty-three hours after operation the stomach was washed out and a large quantity of brown-stained contents were syphoned off; but it was impossible to get the wash-out clear. Apparently active bleeding was still going on as the fluid was reddish tinged and contained fresh blood. At this stage the patient's condition gave cause for anxiety, the pulse was barely perceptible and he was suffering severely from loss of fluid and of corpuscles. Arrangements were therefore made to obtain blood from a tested donor at short notice, should his condition not improve. Two hours later it was reported that his extremities were cold, and that he was pulseless and semi-conscious. Transfusion of blood was therefore performed at the request of the surgeon in charge of the case. 500 c.c. of citrated blood were introduced slowly into the median basilic vein. During the transfusion the patient regained consciousness and his colour improved. The pulse again became perceptible and the blood-pressure was increased. The improvement in the general condition was maintained and no further hæmorrhage occurred.

CASE IV.—Mr A., aged 18, medical student. 28th June 1917. Secondary hæmorrhage following compound fracture of leg. As the result of a motor bicycle accident the patient sustained a compound comminuted fracture of both bones of the leg. Both tibial arteries were torn and there was profuse bleeding at the time. Sepsis followed and the patient developed a swinging temperature and suffered from toxic absorption. Secondary hæmorrhage occurred ten days after the injury and also during the subsequent days. Sixteen days after the injury a profuse hæmorrhage reduced the patient to a low condition. Salines both per rectum and subcutaneously were given, but there was little response, and the patient was in a critical condition. Transfusion of blood was performed at the request of the surgeon in charge of the case.

600 c.c. of blood were transfused by the indirect method with syringes and two-way stopcock apparatus with satisfactory result.

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During the operation, which lasted fifteen minutes, the patient's colour improved. Mentally and physically also he became more vigorous. At the commencement of the transfusion the blood-pressure was from 60 to 70 mm.; at the conclusion it was increased to 105 mm. The pulse rate was reduced from 150 to 120 per minute. The transfusion proved a turning-point in the patient's illness. No further hæmorrhage occurred, and the septic condition of the wound rapidly diminished. One week after the operation the temperature became normal and remained at that level.

CASE V.—Sergeant A., aged 44. Secondary hæmorrhage from axillary artery. 12th December 1918. The former history of this case is referred to later (see Case XI.).

The secondary hæmorrhage occurred from the stump of the axillary artery, fourteen days after the arm had been disarticulated at the shoulder for gun-shot injury. The wound had been left open and the hæmorrhage occurred from an apparently healthy granulating surface. The bleeding was controlled by deep sutures passed around the artery. No anæsthetic was required. As the patient's condition was critical one and a half pints of normal saline were immediately infused into the right long saphenous vein. While this was being done a suitable donor was selected and 700 c.c. of citrated blood were prepared. The transfusion was continued after the infusion of saline was completed. The effect of the saline was slightly to improve the patient's condition, but he still remained collapsed and semi-conscious. He was apparently suffering from a lack of corpuscles. Before the third of the citrated blood had been given the patient's colour began to return, his respirations became quieter, and he regained consciousness; at the conclusion of the transfusion he felt almost as well as before the hæmorrhage.

After the transfusion the blood count was as follows:—

R.B.C.s.	Hb.
2,560,000 . . .	44 per cent.
Four days later, 4,050,000 . . .	63 „

No hæmolysis occurred and the blood counts show that fresh corpuscles were rapidly formed. The patient's subsequent progress was satisfactory and there was no further hæmorrhage.

CASE VI.—Female, aged 25. Secondary hæmorrhage from branches of the internal iliac artery. 16th November 1918. The patient was suffering from tuberculous disease of the left sacro-iliac joint, of several years' standing. Her health has been much affected by the presence of discharging sinuses, and the diseased area had been exposed by an open operation. There was much bleeding at the operation, and subsequently profuse secondary hæmorrhage occurred

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necessitating ligation of the internal iliac artery. Four days later a severe hæmorrhage again occurred, and the patient, who was previously in a feeble condition, became collapsed. The hæmorrhage was controlled by packing. When I saw the case two hours later she was completely blanched and the pulse was felt with difficulty. She was unconscious, and the systolic blood-pressure was 55 mm. Rectal and subcutaneous salines had been given without any apparent benefit. Her condition was obviously hopeless and transfusion seemed to offer the only chance of prolonging life. As no relations or other likely donors were at hand, it was decided to ask a student to volunteer as donor. It was not considered desirable to take the necessary amount of blood from any of those who volunteered, as the individuals were either not sufficiently fit to justify the loss of more than a small amount of blood, or were appearing for their final examination in two days' time. The only justifiable means of obtaining the blood seemed to be to collect it from several individuals, and, in view of the patient's hopeless condition, it was decided to risk the many incompatibilities which such a mixture could produce. 700 c.c. of blood were taken from one nurse, two residents, three students, and the writer. While the blood was being collected and mixed with citrate, the patient became pulseless and appeared to be sinking, and it was a question whether the preparations could be completed before the patient died. A superficial vein was exposed ready for the transfusion while the blood was being obtained. There was no bleeding from the tissues and on opening the vein only a few drops of blood escaped.

After a third of the blood had been introduced, colour appeared in the patient's finger-nails and the pulse became palpable. When half the solution had been given the patient's breathing became somewhat rapid and the rate of flow was retarded. The transfusion occupied 15 minutes. Before its completion breathing was again quiet and the patient was conscious and able to speak and answer questions. At the conclusion of the transfusion the blood-pressure was 90 mm.

No reaction of any kind followed the transfusion and the patient continued to improve till the fifth day, when fresh hæmorrhage occurred. Several profuse hæmorrhages occurred on the following day and the patient died from exhaustion. With our present knowledge of the dangers from transfusion of untested blood it is remarkable that the mixture of the blood of seven donors not only failed to cause any toxic symptoms, but succeeded in saving the patient from imminent death.

My clinical cases have shown that patients reduced to an extreme degree of collapse from hæmorrhage, with air hunger, without pulse, and a blood-pressure reduced to from 50 to 60 mm., can be immediately revived by transfusion of blood

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when other means have failed to ameliorate their condition. Normal saline cannot be regarded as the best solution for raising the blood-pressure. In many cases of severe hæmorrhage the improvement which follows is only temporary, and within a short space of time the blood-pressure again falls to the original level or even lower than it was before. My own experience with colloidal solutions, which are better adapted for mechanically raising the blood-pressure when injected intravenously, is too small to speak from; but in the type of case mentioned simple elevation of blood-pressure, although necessarily improving the circulation and the oxidation of the tissues, may be insufficient to maintain life. Not only the volume of the blood must be increased but corpuscles also are needed, and these requirements can best be obtained by transfusion of compatible blood, combined if necessary with infusion of saline or colloidal solution to increase further the amount of fluid within the vessels. I believe, therefore, that both clinically and experimentally blood transfusion affords a means of saving life in cases of severe hæmorrhage when all other methods of treatment have failed.

During the last year or two of the recent war, military surgeons employed transfusion freely, and the papers published by Archibald,² Primrose and Ryerson,³ O. Robertson,⁴ Bruce Robertson, Hull⁵ and others have amply demonstrated once and for all the wonderful results which may follow transfusion in suitable cases of hæmorrhage or of hæmorrhage combined with shock. Improvements in technique, and particularly the introduction of the citrate method, have widened the scope for transfusion so that it can be safely performed by those without special skill or experience. Finally the introduction of simple and reliable tests for selection of suitable donors by Moss, Brem, and Lee⁶ has removed the last objection which can be raised to the employment of transfusion on the ground of the danger arising from the use of incompatible blood. In spite of the brilliant results recorded by recent writers on the subject, there is reason to believe that the scope and indications for transfusion are not yet thoroughly realised by civil practitioners, and there must be many surgical, medical, and obstetrical cases which die from loss of blood without transfusion having been attempted or even thought of. Looking back on my own limited experience I can recall patients who died from hæmorrhage after prostatectomy, thyroidectomy, gastroenterostomy,

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splenectomy, nephrectomy or from injury, in spite of injections of saline and other measures, whose lives I feel now might possibly have been saved if blood had been transfused.

TRANSFUSION IN CASES OF HÆMORRHAGE COMPLICATED BY SHOCK.

The risks to which the patient suffering from the effects of hæmorrhage is exposed are aggravated when, as so often happens, an operation under general anæsthesia is necessary, possibly to arrest bleeding, or to permit of amputation of a limb, or simply to disinfect the parts.

Patients with a low blood-pressure, whether from hæmorrhage or shock, are notoriously bad subjects for operation, and particularly so if, in addition, sepsis is present. Every surgeon has had experience of cases of secondary hæmorrhage, in which the patient's death has been accelerated by an operation, in spite of subcutaneous or intravenous salines, and other methods to combat shock. Local anæsthesia is seldom practicable, and these patients are specially liable to suffer an increase of shock from the anæsthetic, as well as from the manipulations during the operation. The question again arises whether transfusion of blood is not the most valuable addition to our other means of combating shock in such cases. Certain of my cases bear upon this point.

Cases VII., VIII., IX., X., and XI. were all examples of patients suffering from loss of blood, combined with shock, due to an operation. In four of these cases, the transfusion was performed after operation, as the patient's condition seemed desperate. In each case the usual anti-shock treatment had been tried, and the cases, therefore, served as an excellent test of the comparative value of blood transfusion. Except in Case VII., transfusion proved to be life-saving. In the remaining case, blood was transfused during an operation in order to minimise the anticipated shock, and this it did successfully.

CASE VII.—Mrs A., aged 40. 4th March 1917. Ruptured ectopic gestation. This patient was suffering from extreme exsanguination following a ruptured ectopic gestation. She had been collapsed for twenty-four hours prior to admission, and was only partly conscious when she went on to the operating table. The operation was prolonged and difficult, and there was therefore in her anæmic condition an increase of shock which further lowered her vitality. Intravenous

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salines had failed to raise the blood-pressure and transfusion was suggested as a *dernier ressort* by the surgeon in charge of the case. Indirect transfusion by syringe and two-way stopcock apparatus was performed and caused a distinct improvement in the patient's condition. The pulse became palpable but the blood-pressure remained low and the pulse small and fast, and death occurred within twenty-four hours without the patient having recovered from her collapse. The transfusion had to be stopped when 500 c.c. of blood had been given, as the donor was becoming faint. In such cases of extreme anæmia following hæmorrhage 1000 c.c. are probably the ideal amount. While it is impossible to say that a larger amount would have saved the patient's life, it is reasonable to conclude that transfusion was not properly tested in this case, although it certainly prolonged life for a few hours.

CASE VIII.—J. M., aged 9. 23rd November 1917. Lacerated wound. This was a case of severe shock combined with a moderate loss of blood. Shock was the predominant feature, and the loss of blood in the absence of traumatic and operation shock would have been of slight consequence. The patient, a boy aged 9, was admitted suffering from a severe injury of the right leg, as the result of the limb being run over and dragged by the wheel of a motor car. He was suffering from such severe shock that the extent of the injuries could not be immediately ascertained. Anti-shock measures improved his condition sufficiently to permit of his being anæsthetised four hours later. The skin and fascia had been split down the inner side of the limb from the lower part of the abdomen to within three inches of the internal malleolus, and were almost completely detached, so that the underlying muscles on the postero-lateral aspect of the limb were exposed. The capsule of the knee-joint was torn and the joint cavity exposed behind the outer edge of the patella. After clipping away the soiled tissues, and cleansing the raw surfaces with eusol, the knee-joint was closed and the skin flaps sutured and drained.

On returning to bed the patient, in spite of rectal and subcutaneous salines, remained collapsed. No improvement followed intravenous injection of saline, and, some hours later, as it was apparent that the child was sinking, it was decided to perform transfusion, the boy's father acting as donor. While 400 c.c. of blood were being transfused with the syringe method the pulse became palpable, and at the conclusion the blood-pressure was much higher than it had been before. The immediate improvement following transfusion was maintained, and the subsequent recovery from the condition of profound shock was rapid and complete. The knee-joint escaped infection, but large areas of skin subsequently sloughed and required to be replaced by skin grafts.

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CASE IX.—Miss C., aged 47. 11th July 1918. Profound anæmia from hæmatemesis, perforation of a gastric ulcer, laparotomy. This patient had been under observation for several weeks. Symptoms of gastric ulcer had developed shortly after the operation of nephrectomy performed for pyonephrosis. Repeated attacks of hæmatemesis had reduced her to a profoundly anæmic condition, and in addition she was suffering from the effects of starvation for several days during which she had been kept on rectal salines. When in this reduced condition her gastric ulcer perforated during the night. When her condition was reported to me on the following morning I found the recti rigid, the abdomen distended, and loss of liver dulness. The general condition of the patient was extremely feeble. Reduced in strength by several weeks of illness, exsanguinated from repeated loss of blood, collapsed from the pain and shock of the perforation, it seemed almost hopeless to subject her to operation, especially as no suitable donor was available for transfusion. As she had, however, already shown wonderful stamina I decided to give her the chance of operation. After closure of a large perforation and suprapubic drainage the patient was returned to bed. Four hours later she was semi-conscious, the pulse was just palpable and 160 per minute; blood-pressure 65 mm., respirations 50. Having obtained a donor, it was now arranged to perform transfusion.

750 c.c. of whole blood had the immediate effect of restoring the patient to consciousness, and of saving her life for the time being. The blood-pressure was raised to 95 mm. and the respirations fell to 28 per minute. The patient was apparently well on the way to recovery when, five days later, a second perforation occurred (confirmed post-mortem), which proved fatal within twelve hours. Prior to transfusion the patient had absorbed as much saline as was possible without producing œdema. The effect of the transfusion was to supply the deficiency in corpuscles and to raise the blood-pressure and maintain it at a level compatible with life.

CASE X.—R. C., aged 23. 5th January 1917. Secondary hæmorrhage from axillary artery, post-operative shock. The patient suffered from recurrence of secondary hæmorrhage from the axillary artery following a gun-shot wound. The third part of the subclavian artery was ligated, but after the operation the patient remained unconscious, collapsed, and suffered from air-hunger. His vitality had previously been reduced by considerable suffering and loss of blood. The recent hæmorrhage had been profuse, and the operation, although neither difficult nor prolonged, had added the effects of shock to those of loss of blood. The pulse rate was 140 and the systolic blood-pressure 65 mm.; the skin was cold and the respirations were sighing. Subcutaneous and rectal salines failed to improve his condition, and it

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was decided to transfuse in order to give him a chance of recovery. 700 c.c. of blood were given by the syringe method. The patient rallied during the transfusion. His pulse, respirations, and colour were markedly improved, and towards the close of the transfusion he became quite normal mentally.

He was able to take a hearty meal the same evening. Unfortunately a fresh hæmorrhage occurred seven days later, when he was apparently making excellent progress, and he died within an hour from loss of blood before steps could be taken to transfuse him again.

CASE XI.—Sergeant A., 44. 28th November 1918. Secondary hæmorrhage from axillary artery following gun-shot wound. Disarticulation of shoulder and simultaneous transfusion of blood.

In this case the patient was reduced to the last degree of exhaustion by repeated secondary hæmorrhages from the axillary artery, and by septic absorption from gun-shot wounds involving the shoulder and upper arm. In spite of previous ligation of the third part of the sub-clavian artery, a profuse secondary hæmorrhage had again occurred from the upper part of the axillary artery. The patient's condition was desperate as the bleeding point was inaccessible for ligation. In addition the hand was becoming gangrenous and the entire upper arm was paralysed. The artery could not be ligated without an operation under general anæsthesia, but his condition made it extremely doubtful whether he would stand the operation. It was further obvious that simple ligation was insufficient, as the arm was useless and becoming gangrenous, and a source of serious danger from the extent and septic nature of the wounds. Disarticulation at the shoulder was indicated both to facilitate ligation of the artery and to remove the sources of septic absorption. As the patient's condition seemed hopeless if he were left alone, and as his chances of recovery appeared to be remote if his arm were amputated, unless his general condition could be improved, it was decided to risk the major operation and to perform simultaneously transfusion of blood. 800 c.c. of citrated blood were injected while the arm was disarticulated at the shoulder. Improvement in the circulation and blood-pressure was noticeable while the operation was in progress. At the beginning of the operation the tissues were almost bloodless, but towards the close numerous bleeding points required to be caught. When the patient returned to bed, minus his arm, he was in better condition than before the operation. Transfusion restored the patient from extreme collapse due to loss of blood, and also diminished the degree of shock from the operation and general anæsthetic, the effects of which would otherwise almost certainly have been fatal. Fourteen days later, when the patient was apparently progressing favourably, a fresh profuse hæmorrhage occurred,

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from the effects of which the patient was again rallied by transfusion (see Case V.).

Cases VIII., IX., X., and XI. demonstrate that transfusion of blood is a most valuable procedure in cases of hæmorrhage complicated by shock.

In all except Case VIII. hæmorrhage was the main cause of the collapse, although there is no doubt that, owing to the loss of blood, the degree of shock caused by the operations was considerable. I have had little experience of treating cases of pure shock by transfusion. Case VIII. was one in which shock was the primary factor, but there had also been a moderate loss of blood. The successful result in this case was due to the fact that the shock, although extreme, had lasted only a few hours, and that the blood-pressure was satisfactorily raised and maintained by the transfusion. In certain of my cases, transfusion would have been of even greater value if performed earlier. Delay was frequently due to difficulty in getting a suitable donor.

Shock was the outstanding feature of Case XII.

CASE XII.—In this case the patient suffered from intractable vomiting due to vicious circle following gastro-enterostomy. Ten days after the original operation a lateral anastomosis between the two limbs of the loop was made. The results of this operation were, however, disappointing and the vomiting continued. In spite of rectal alimentation the patient rapidly became collapsed and he himself believed his condition to be hopeless. It was finally decided to give him the chance of a further operation and to replace the posterior by an anterior gastro-enterostomy. At the request of the surgeon in charge of the case preparations were made to perform transfusion during the operation. The appearance of the tissues was typical of deep shock. There was no arterial bleeding; the blood appeared in the form of a venous ooze, more from capillaries than individual vessels. A transitory improvement followed transfusion. Bleeding became slightly more active and the pulse at the wrist was palpable; but there was no spouting of arteries, and towards the close of the operation the patient was even more collapsed than at the commencement. Half a pint of gum solution (6 per cent.) infused intravenously produced no response. The patient died two hours after the completion of the operation. The case demonstrated that a degree of exhaustion, combined with severe shock, can be reached which will not respond favourably to attempts to raise the blood-pressure or to maintain it by intravenous injections of fluids or of blood.

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I have seen cases of recent acute hæmorrhage, in which the patient's condition was even more urgent than in the above case, revived by transfusion of blood, and I agree with other observers with more experience, that transfusion is not so successful in relieving patients suffering from shock as in cases of collapse from hæmorrhage, or in cases of hæmorrhage combined with a moderate degree of shock.

Although in cases of pure shock there is no loss of corpuscles, the volume of circulating blood is reduced, and there is deficient oxidation of the tissues. It is reasonable to believe that the intravenous injections of fluids which can raise and maintain the blood-pressure would be almost as efficient as blood for the purpose. On the relative merits of gum or gelatine solutions when injected intravenously for the treatment of shock, I am not in a position to speak; but I think there is no doubt that the transfusion of blood is more efficacious than infusion of saline in cases of shock, and, further, that when shock is combined with loss of a considerable amount of blood, transfusion is indicated, and is the most certain means of saving life.

Apart from shock, patients suffering from sepsis are less likely to recover quickly from loss of blood than when the effects of septic poisoning are absent. Repeated hæmorrhages are liable to hasten the patient's death. Lowered vitality from loss of blood prevents the sepsis from being overcome, and the toxic condition maintains the anæmia. Such patients often require operation, and, therefore, occasions must frequently arise when transfusion of blood is called for. In reanimating patients suffering from secondary hæmorrhage, transfusion yields as striking results as in cases of primary hæmorrhage. My cases of secondary hæmorrhage are too few to permit of exact deductions being drawn as to the effects of transfusion on the condition of the wounds. I believe that, in certain of the cases, transfusion did raise the patient's resistance to the infection; but there was no evidence that the improvement was specific in nature, or due to the protective qualities of the serum of the transfused blood. It is possible that transfusion may favourably influence the septic process in wounds in three ways:—1. By diminishing anæmia, and by improving the patient's general condition and vitality; 2. By stimulating the hæmopoietic organs; 3. By the introduction of fresh antibacterial or anti-toxic substances.

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from an immune donor, who has recovered from a similar infection or has been immunised against it, has already been demonstrated by several observers, and there is every reason to think that work along these lines will yield useful results in the future.

EFFECTS OF TRANSFUSION ON ARREST OF HÆMORRHAGE.

As far as my observations go, transfusion of fresh blood does in certain cases aid the spontaneous arrest of hæmorrhage. This appears to be the case particularly when the continuance of the hæmorrhage is due to conditions, such as hæmorrhagic disease of the new-born or hæmophilia, in which the coagulation time of the blood is prolonged. I have had no opportunity of treating a case of hæmophilia, but the results of the cases recorded in literature show that transfusion of healthy blood has a specific action in arresting the bleeding in this disease.

Unger⁷ has recorded seven cases of hæmophilia in which the bleeding was arrested by a single transfusion of whole blood; in one case, however, two additional transfusions were necessary before the hæmorrhage was controlled, and in this case it was found that citrated blood was not so effective as whole blood. In five of the cases the patient's life was saved by the transfusion, after almost every possible means had been tried, without success, to stop the bleeding.

According to Bernheim, as a rule 100 or 200 c.c. of blood are sufficient to arrest bleeding, but in cases of exsanguination large amounts can be given with advantage. Ottenberg and Libman,⁸ Petersen and others, have had equally good results in hæmophilia. The alarming symptoms are controlled, and although the patient is not cured, immunity against recurrence of bleeding is conferred for a variable time. These observers have therefore suggested that small quantities of blood should be injected intravenously at intervals of one to three months. As age advances the tendency to bleed diminishes, and therefore it might be possible to tide over the dangerous period by prophylactic treatment.

Ottenberg and Libman found that fresh serum or defibrinated blood applied to the bleeding point had an undoubted effect in some cases, but that serum introduced subcutaneously or intravenously had no effect on hæmorrhage, and did not alter the coagulation time of the hæmophilic's blood. Serum treatment

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had been tried without avail in practically all of their cases of hæmophilia in which the bleeding was arrested later by transfusion of blood.

These facts, therefore, demonstrate that transfusion of blood is the method of choice in cases of hæmophilia if the symptoms are alarming, or if the bleeding continues in spite of other methods of treatment.

The advantage of transfusion is that it not only controls bleeding, but replaces the blood which has been lost, and therefore improves immediately the patient's general condition.

The effect of transfusion in arresting bleeding in the case of hæmorrhagic disease of the new-born is as striking as that which follows transfusion in hæmophilia. The mortality from *melæna neonatorum* and other forms of bleeding in the new-born is, unfortunately, high; and in these conditions there is, apparently, delay in coagulation.

The value of transfusion was clearly shown in Case I., in which the patient, an infant aged ten hours, was suffering from *melæna neonatorum*. As a result of intestinal hæmorrhage, the child was profoundly anæmic, and was reduced to a moribund condition; and, while in this critical state, blood was transfused from the father. Transfusion promptly restored the child to a vigorous condition, and no further bleeding occurred. This operation was done six years ago, and the child is reported to have remained well ever since. The only alternative to transfusion of blood in these cases appears to be the subcutaneous injection of serum or of blood; and there is no doubt that this treatment, introduced by Welch in 1910, has greatly reduced the mortality. Robert Hutchison⁹ has recently recorded three cases of hæmorrhagic disease of the newly-born successfully treated by the subcutaneous injection of whole blood, or blood serum in amounts of from 5 to 8 c.c.; but, although the patients recovered, there was a further hæmorrhage in each case.

According to Hutchison, it is impossible to say with certainty how serum acts, but it is probable that it supplies some constituent, lacking in the infant's blood, which is necessary for clotting. Hutchison further suggests that normal horse serum or anti-diphtheritic serum would act as well as human serum.

If, as Hutchison suggests, the effect of serum is to raise the coagulability of the blood, it is obvious that the desired effect could be better obtained by intravenous injection of whole blood.

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Little notice seems to have been taken in this country of the advantages of transfusion for this condition. As the case recorded here shows, a moribund infant may be almost immediately restored to a healthy condition by transfusion of blood. The value of transfusion in such cases lies not only in the arrest of the hæmorrhage, but in the replacement of the blood which has been lost. It is perfectly obvious, therefore, that transfusion can restore patients reduced to a stage of collapse, which could not be expected to yield to the subcutaneous injection of small amounts of serum or of blood. This statement is supported by the experience of Unger, who found that, as in hæmophilia, transfusion will save life in cases not helped by subcutaneous injections of serum or of blood.

The intravenous injection of 50 to 100 c.c. of whole blood by means of syringes is so simple in infants that there is no object in delaying transfusion in critical cases, which will include the majority, once the diagnosis has been established. In less serious cases transfusion should not be delayed for more than an hour or two, if it is evident that subcutaneous injection of blood or of serum has failed to arrest the bleeding.

A sufficient number of cases of purpura hæmorrhagica, treated by transfusion on account of the anæmia, have been recorded to show that in a considerable proportion the tendency to hæmorrhage is arrested at least temporarily. My own experience of transfusion in this disease is limited to two cases, one of which was not benefited. In the second case the patient was improved for a few weeks, but the symptoms soon relapsed and caused the patient's death. After the exposure of the patient's vein there was excessive and continued oozing of blood from the tissues of the wound, and the interesting observation was made that the capillary bleeding was arrested by the transfusion. As the coagulation time of the blood in purpura is little altered, it has been suggested that the hæmostatic effect of transfusion may be due to the introduction of fresh blood platelets which are known to be reduced, especially during or after a period when hæmorrhages have occurred. It is obvious that the continued freedom from recurrence of hæmorrhage, which is occasionally observed, is not sufficiently explained by this theory, as the normal duration of blood-platelets in the circulation is known to be short. Further observations are required before any expression of opinion regarding the value of transfusion in this disease would be justified.

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I believe that transfusion of blood will sometimes favour the arrest of hæmorrhage in cases where the coagulation time of the blood is normal, or at least not materially altered as it is in hæmophilia or in infants with hæmorrhagic diathesis. In some cases of repeated bleedings, with the patient becoming progressively more anæmic, there seems to be little tendency for spontaneous clotting to occur even when the coagulation time of the blood is not lengthened. Any clots which form are apt to be soft and non-adherent, and it seems likely that, without altering the coagulability of the blood, transfusion can favour natural arrest by providing a firmer clot:

This result was noted in one of my cases of secondary anæmia. The patient was reduced to a profound degree of anæmia by repeated hæmorrhages from the hæmorrhoidal veins, and he was transfused in order to improve his condition preparatory to operation for an enlarged prostate. The patient's condition was improved by the transfusion as regards his anæmia, and no fresh bleeding occurred in the interval after transfusion till the patient's death, some weeks later, from surgical kidney.

In cases of internal hæmorrhage where the bleeding point is not controlled, as in hæmorrhage from the stomach or duodenum, it would naturally be concluded that the effect of raising the blood-pressure by transfusion would be to increase the hæmorrhage, and that the blood which was introduced would quickly be lost again. There is a good deal of clinical evidence to prove that this effect of transfusion need not be greatly feared. It is always a difficult point, in cases of prolonged bleeding from a gastric or duodenal ulcer, to decide whether to keep the patient quiet and to wait for the hæmorrhage to cease, or to operate. Against operation, there is the fact that in most of these cases the bleeding stops spontaneously, and the patient finally recovers; there is also the possibility that, when the abdomen is opened, the bleeding point cannot be found or satisfactorily secured. If, after hesitating to operate in a case of gastric bleeding, whether from an ulcer or after an operation on the stomach, it is apparent that the bleeding shows no signs of ceasing, and the patient's condition is becoming critical, the risks of operation will be considerable, and such cases will not infrequently die, if operated on, from the combined effects of loss of blood and shock. It is obvious that when the patient is profoundly anæmic his condition could be

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improved whether an operation has to be performed or not, provided that transfusion does not increase the amount of bleeding. Cases II. and III. may be referred to in this connection, as in both of these cases transfusion produced a favourable turn at a period when the patient was becoming progressively more collapsed, and in imminent danger of death from hæmatemesis.

Case II. was transfused as an urgent procedure because of collapse from gastric hæmorrhage. At the time of the transfusion the exact cause of the hæmorrhage was not determined, the provisional diagnosis being hæmorrhage from a gastric vein in relation to cirrhosis of the liver. The patient was pulseless, cold and restless, and gasping for air. 700 c.c. of citrated blood were injected with satisfactory result, the patient's symptoms being immediately relieved. The increasing collapse and respiratory embarrassment suggested that the bleeding had continued up to the time of the transfusion, after which no further hæmorrhage occurred. Although it cannot be definitely stated that the arrest of the hæmorrhage was due to the transfusion, it was at least certain that the improvement in the patient's general condition and the increase of blood-pressure neither prolonged the hæmorrhage nor caused it to start afresh.

Case III. was another example of a case in which it was considered doubtful at the time what the effects of transfusion would be on an uncontrolled bleeding point. Gastro-enterostomy had been performed thirty-six hours previously for duodenal ulcer. Hæmatemesis commenced soon after the operation, and continued during the period stated. The stitching had been done with great care, and there was some doubt whether the bleeding was from the ulcer, as in a previous case, or from the gastro-enterostomy opening. Three hours before the transfusion the stomach was washed out, and the reddish tinge of the contents showed that there was fresh bleeding at the time. Subsequent to the lavage there was no more sickness, but the patient became steadily more collapsed, and finally was cold, clammy, and pulseless. It was difficult to say if the bleeding had been arrested by the washing out of the stomach, but the fact that he became restless from air hunger, and semi-conscious, pointed to its continuance. In any case the effect of the transfusion was immediate, restoring the patient to complete consciousness and improving his pulse

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and colour, and the improvement in the circulation continued without any recurrence of hæmorrhage.

The amount of blood in this case was limited to 500 c.c. because sufficient improvement followed injection of that amount, and it was considered inadvisable to raise the blood-pressure too much in case of exciting fresh hæmorrhage.

Although it cannot be proved that in either of the above cases the hæmorrhage was arrested by transfusion, the fact is established that transfusion can be done in certain cases of uncontrolled hæmorrhage from the stomach with immediate benefit to the patient, and without causing fresh bleeding. In comparison with transfusion the intravenous injection of saline is less efficacious in cases of exsanguination, and it has the further disadvantage of lessening the coagulating power of the blood, a point of importance where the bleeding is not controlled. Transfusion can be relied upon to improve the patient's condition, at least temporarily, and the evidence shows that when a moderate amount of blood is transfused, coagulation is favoured. Naturally, if the vessel at fault is a large one, transfusion will fail to arrest the bleeding and nothing is likely to save the patient except operation, the risks attendant to which may be very great indeed. Transfusion of blood, therefore, might conceivably be the only means of rallying the patient sufficiently to enable the operation to be successfully performed. I have observed several patients who have died from continuance of hæmorrhage from gastric or duodenal ulcers, or after operations on the stomach, in spite of the usual treatment, whose lives I now think might conceivably have been saved if transfusion had been tried.

The value of transfusion in cases of gastric and duodenal hæmorrhage does not appear to have been sufficiently recognised, and, in this connection, I should like to quote the results obtained by Ottenberg and Libman, who record fourteen cases of gastric and duodenal ulcer, all of which were in desperate condition from severe anæmia and progressive hæmorrhage at the time of the transfusion. Twelve of the fourteen cases recovered, the remaining two cases dying from peritonitis or complications of laparotomy. These observers were struck by the fact that in almost all of the cases the hæmorrhage stopped after the transfusion.

As regards the relation of transfusion to the recurrence of secondary hæmorrhage in septic cases, my impression is that,

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when large arterial trunks are involved, the subsequent immunity of the patient from fresh hæmorrhages depends almost entirely on the elimination of the local sepsis. If the septic condition of the wound does not rapidly yield to antiseptic treatment, fresh hæmorrhages may occur, possibly hastened by the increased arterial pressure and improvement in the health following transfusion. Other things being equal, the transfusion undoubtedly will speed up the reparative process, which unfortunately is slower in the coats of the infected artery than in the surrounding tissues. Frequently in these cases the artery may be found buried in healthy granulation tissue, and yet, when it is ligated for a secondary hæmorrhage, the vessel wall is still soft and friable. The infection seems to cling to the stumps both of ligated arteries and of nerve trunks after the surrounding parts have become clean and healthy.

In chronic cases of sepsis, associated with repeated small hæmorrhages, transfusion may stimulate the patient's power of resistance, and indirectly prevent subsequent bleedings; but, as far as I have seen, the local treatment is the important factor in the prevention and arrest of hæmorrhage due to sepsis.

CONCLUSIONS REGARDING THE VALUE OF TRANSFUSION OF BLOOD IN CASES OF PRIMARY AND SECONDARY HÆMORRHAGE.

1. Transfusion is frequently life-saving, when other treatment for the constitutional effects of hæmorrhage has failed.
2. It diminishes the amount of shock during operations on exsanguinated cases.
3. It has a restorative effect in cases suffering from the combined effects of hæmorrhage and shock, either traumatic or operative, when other treatment has failed.
4. It can raise and maintain the blood-pressure, and restore patients suffering from severe shock, when other treatment for shock has failed.
5. It is less effective in cases of pure shock than in cases of hæmorrhage.
6. The immediate response to transfusion is as pronounced in cases of secondary hæmorrhage as in primary hæmorrhage.
7. Transfusion may improve the patient's resistance to infection, and indirectly hasten healing of septic wounds.

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8. Transfusion has a specific action in hæmorrhagic disease of the newly-born, arresting the hæmorrhage, and permanently restoring the patient to health.

9. Transfusion has a specific action in hæmophilia, and is the most certain means of arresting bleeding in this disease. Immunity against recurrence of hæmorrhage is conferred for a variable time.

10. Transfusion may temporarily diminish the tendency to hæmorrhage in cases of purpura hæmorrhagica, but there is little evidence that it can materially alter the course of the disease.

11. Transfusion will, in certain cases of secondary anæmia, associated with repeated small bleedings, favour the natural arrest of hæmorrhage.

12. Transfusion may save life in cases of uncontrolled gastric or duodenal hæmorrhage, and in such cases encourages the arrest of bleeding by improving the quality of the clot.

13. When the bleeding has ceased spontaneously, the transfusion of a moderate amount of blood is unlikely to excite fresh hæmorrhage.

14. The local treatment of septic wounds is the most important factor in preventing a recurrence of secondary hæmorrhage, and transfusion can only indirectly diminish the risk of bleeding.

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ON ARTIFICIAL ROTATION OF THE HEAD IN PERSISTENT OCCIPITO-POSTERIOR POSITIONS.*

By J. LAMOND LACKIE, M.D., F.R.C.P.E., Physician to the Royal Maternity and Simpson Memorial Hospital; Gynæcologist to the Hospital for Women, Archibald Place; Assistant Gynæcologist, Leith Hospital.

THERE can be no doubt that occipito-posterior positions of the vertex form the bulk of the difficult cases met with in obstetrics alike by the general practitioner and by the specialist. It is also safe to say that in no class of cases is so much haphazard and clumsy work done as in the management of these labours. Brute force is too often the only method resorted to to effect delivery, and irreparable damage to countless mothers and children has resulted from an unscientific and too forceful use of the forceps. It is readily admitted that in a small proportion of cases of R.O.P. position, traction, without any regard to the position of the head, effects delivery, and no permanent damage results, but in such, an unjustifiable risk is taken when other means are available by which a comparatively easy delivery may be effected. It is further admitted that in a still smaller proportion of cases forcible traction is the only way—all other means having proved unsuccessful—but these cases are very rare, and most often result from the cause of the malposition, such as a contracted pelvis or some abnormality of the head. In the vast majority, by simple manœuvres, a labour complicated by an occipito-posterior position can be terminated almost as easily as a normal left-occipito-anterior.

Malposition of the vertex occurs in at least 25 per cent. of head-first labours. In 80 per cent. of these, spontaneous rotation occurs and the labour terminates naturally. In 20 per cent. the position is persistent and the occiput does not rotate at all or does so into the hollow of the sacrum.

The first essential in the proper management of occipito-posterior positions is an absolutely accurate diagnosis. This is frequently possible from the ordinary signs: the limbs of the child, or the feet, occupy the front of the uterus; the foetal heart is not easily heard or is heard well round to the side of the abdomen, the anterior fontanelle is felt to the front, the

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head is high up, the first stage is unduly slow, the os does not dilate fully, and the membranes may rupture prematurely. But in many cases it is impossible to be certain of the position, and in all cases of doubt, chloroform should be administered even in the first stage of labour, and with several fingers, or even the whole hand, in the vagina a diagnosis becomes certain. The position of the fontanelles can be definitely ascertained, and the diagnosis is confirmed by feeling the ears and noting their direction.

A diagnosis of an occipito-posterior position having been made, it is not recommended that interference take place at once. So long as progress is made in any way, and that not too slowly, the case should be left to nature, and in a large proportion of cases the result will be satisfactory, especially under the influence of "twilight sleep." If, however, hour after hour passes and the head remains high up, with the os not fully dilated, and the pains becomes weak, the patient should be anæsthetised and the whole hand introduced into the vagina. The dilation of the os is completed artificially and the hand is passed beyond the head; the membranes are then ruptured and the fingers, reaching a shoulder, the whole child is rotated on its longitudinal axis, with the help, if necessary, of the left hand acting through the abdominal wall. The vertex is thus placed in the R.O.A. position, or even in the L.O.A., and the hand is then withdrawn, preferably during a contraction, if such exists. After allowing a short time for moulding of the head, forceps are applied and easy delivery effected. Forceps are required in most cases, since, by this stage of the labour, the mother is exhausted and the contractions of the uterus are feeble, but spontaneous delivery is possible, although it has no advantage. Nothing is easier and simpler than the manipulation just described, and what at first seems likely to be a most difficult labour becomes, in the later stages, an almost normal and natural one.

Such is the ideal management of a persistent occipito-posterior position, recognised and rectified at the ideal time—viz.: at the end of the first stage of labour, before the liquor amnii has escaped, but only, of course, when it becomes clear that interference is necessary. But what of the more frequent condition in which the position is not diagnosed till the second stage of labour is entered upon, the liquor amnii has escaped to a large extent, and the head is more or less fixed at the brim or

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in the cavity of the pelvis? The treatment so commonly recommended of promoting flexion by pressing up the sinciput during a contraction is useless. If the case has reached the stage when artificial aid is required, the pains are unsatisfactory, and promoting flexion, and at the same time attempting to press the sinciput round the pelvis, does absolutely no good at all. In these cases the hand must be introduced into the vagina and an attempt made to push back the head and to rotate the whole child just as was recommended in cases treated during the first stage. If this is impossible, as it often is, the head must be grasped with the hand and rotated into an anterior position, while at the same time the left hand, acting through the abdominal wall, attempts to rotate the shoulders. If the shoulders cannot be rotated, the difficulty is to get the head to remain in the anterior position, and one must fix the head as much as possible with the right hand and apply the forceps with the left. It has been urged that this manœuvre is attended with danger to the child since the neck must be twisted, but this danger is exaggerated, and no harm really results.

Supposing that this manipulation fails and the head cannot be rotated by the hand, there is still a manœuvre which should be resorted to before relying on traction only. This consists in applying forceps in the usual way and rotating the head by means of the instrument. This method has recently been strongly advocated by Dr Arthur Bill of Cleveland, Ohio, in a paper read at a meeting of the American Association of Obstetricians and Gynæcologists. It can be used equally well in multiparæ and in primiparæ, and it can be used when the head is at the brim, in the cavity, or at the outlet. The cases most suitable for this forceps-manipulation are those in which the head is through the brim and is lying in the cavity of the pelvis or on the pelvic floor, for then only can the essential sweeping movement of the handles be carried out. When the head is high up at the brim, rotation by the hand is safer and easier. Having applied the forceps it is well to push the head gently and slightly back, and then rotation is easier. Some American obstetricians carry a straight pair of forceps for the purpose, but the ordinary forceps with a pelvic curve do perfectly well, provided the rotation is properly done. The handles are carried round in a large circle, just as a sound is used in replacing a retroverted uterus. This sweeping movement of the handles keeps the blades in the same axis during the

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rotation, which is generally accomplished quite easily, and once the occiput occupies an anterior position it is well to exert a little traction so as to fix the head and prevent it turning back to the original position. The forceps are then removed and reapplied, and the delivery slowly effected. Then, and then only, is traction used at all. If the head does rotate back the manipulation must be repeated. The important point in this manœuvre is that during rotation there should be no traction. It must not be an attempt to produce a spiral movement on the part of the head by a combination of rotation and traction. Only after rotation is accomplished should traction be adopted.

In these cases of persistent occipito-posterior position every possible manœuvre should be adopted to rectify the malposition before resorting to brute force in delivering the head either without rotation occurring at all, or only after much severe pulling when it may rotate at the outlet. Such treatment tends to cause severe damage to the mother and the child at the time, and is the most frequent cause of prolapsus uteri later, since the dragging on the anterior segment of the pelvic floor while the occiput is behind, so loosens the anterior vaginal wall from its underlying tissues that later the various stages of descent of the uterus readily occur.

In illustration of these methods, I shall shortly describe two recent cases.

CASE I.—On 8th October at 9.30 A.M. I was called to Mrs S., a young primipara. She had started labour at 2 A.M. and had satisfactory regular pains. When I saw her the os was the size of half-a-crown and the head was at the brim. At 4 P.M. the os was 3 inches in diameter and the head was still at the brim with the membranes unruptured. A diagnosis of R.O.P. was easily made. At 9 P.M. the conditions were exactly the same as at 4 P.M. except that the pains were feebler and the patient was becoming exhausted. Chloroform was administered and the whole hand introduced into the vagina: the os was dilated to allow the passage of the hand into the uterus and then having ruptured the membranes, the fingers were applied to the right shoulder and the whole child rotated on its longitudinal axis till the head came to lie in the L.O.A. position. The hand was then withdrawn and the patient allowed to come out of chloroform. Contractions recommenced, but an hour later the head was found to be only through the brim and therefore forceps were applied under anæsthesia and delivery of an 8½ lbs. child was easily effected.

CASE II.—On 29th October at 3 A.M. I was called to Mrs P. T.

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at a Nursing Home. She was a II-para and was at full time. The first sign of labour had been the rupture of the membranes at 8 P.M. on the 28th, and pains started soon thereafter. On examination, the os was nearly fully dilated and the head was through the brim, but placed in the R.O.P. position. Contractions were strong and occasional whiffs of chloroform were administered, but on examination at 4.30 A.M. the conditions were exactly the same as at 3 A.M. Deep anæsthesia was therefore attained, and the whole hand introduced into the vagina and the os dilated to the full extent. An attempt was made to catch the head by means of the hand and to rotate it but this failed, and therefore forceps were applied and the head rotated with comparative ease into the R.O.A. position, in which it was then fixed by gentle traction. The instruments were removed and reapplied and in the course of a few minutes a $7\frac{1}{2}$ lbs. child was easily delivered.

It may be questioned whether one would recommend the method of rotation by forceps to students as a routine treatment, and indeed it has been the habit of teachers here to warn beginners in Obstetrics against it. Personally I consider it not only a most rational method of treatment but a perfectly safe one. No doubt experience in practical Midwifery is necessary in order to appreciate exactly the object and aim of the operation, and it would be well for the student to see the manipulation done before undertaking it in practice. Once the manœuvre is thoroughly understood and properly carried out the results obtained from it can only be described as wonderful.

A SHORT STUDY OF TUBERCULOSIS IN ONE DIVISION OF THE NAVY.

By SURGEON LIEUTENANT C. J. CAMPBELL FAILL, R.N.

TUBERCULOSIS is such an important subject, and the amount notified in civil life as well as in the Army and Navy is increasing so rapidly, that it behoves all of us who have to do with its diagnosis and treatment to record our observations carefully, so that useful deductions may be drawn from the facts accumulated all over the country.

In the following short paper I propose to consider the cases invalided from the Royal Navy at Plymouth Hospital with tuberculosis of lungs between 1st January and 30th June 1918. I had intended also to study the surgical tubercle in the hospital during the same period, but was compelled to abandon the project.

Until fairly recently it has been the custom in the Navy to reserve the diagnosis tuberculosis of lungs for those cases in whose sputum tubercle bacilli have been demonstrated. This procedure has been discontinued, and early cases, with every prospect of cure, are now sent to sanatoriums. It is a notorious fact that the discharge of tubercle bacilli is one of the later symptoms, and that to delay sanatorium treatment till the organisms appear is, in the majority of cases, seriously to imperil the patient's future prospects, if not his life. The Local Government Board has frequently issued strongly worded statements on this point.

In the six months' period under review there were discharged from the R.N. Hospital, Plymouth, 110 ratings with tuberculosis of lungs. The above figure does not include officers. Of these 110, 102 were invalided either to their own homes or to sanatoriums, and 8 died in hospital.

Fatal Cases.—Eight. Of these, six were advanced on admission, and two were early and very acute cases which ran a rapid course. Both of these latter patients were between 15 and 20 years of age. In one of them an artificial pneumothorax was induced to control persistent hæmoptysis. The bleeding was stopped, but the disease progressed very rapidly in the other lung, and the patient survived only a fortnight.

Sputum.—Fifty-nine patients showed tubercle bacilli in their sputum; in fifty-one no bacilli were ever demonstrated. The negative sputa were repeatedly examined, in no case less than

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eight times during the patient's stay in hospital, and all were done at least once by the antiformin method. Many of these were early cases with little sputum on admission, who improved rapidly with open-air treatment, and after a very short time completely lost both cough and sputum.

Family History.—This was investigated as carefully as possible, but the great majority did not know much about their relatives. In fourteen cases a definite family history of tuberculosis was obtained. It is a curious fact that men are rarely able to give any information about their relations, while women not only know all details of their own families but of their husbands' also.

Previous Treatment.—Two cases had received sanatorium treatment prior to entry into the service. There has been a good deal of discussion on this point, but it is now generally considered inadvisable to admit into the Army or Navy anyone who has been in a sanatorium, no matter how fit he may appear to be at the time of examination.

Age.—

15-20.	20-25.	25-30.	30-35.	35-40.	Over 40.
21	31	19	16	12	11

This table calls for no comment. Hippocrates pointed out that pulmonary tuberculosis was most common between the ages of 18 and 35 years.

Trauma.—In no case was there a history of any chest injury, however slight.

Branch of Service.—R.N., 67; R.M.L.I., 10; R.A.F., 10; R.N.R., 6; R.N.V.R., 5; R.N.R.T., 10; R.F.R., 1; M.M., 1.

Of the Active Service Ratings twenty-eight were stokers and twenty-seven seamen, only four are described as "Hostilities Only," and only one boy rating was included signal boy. The large number of Active Service Ratings is very striking and requires further investigation. The Royal Air Force number is large probably on account of the number of Grade 3 men recruited.

R.N.R.T. is entered with very superficial medical examination, and their number—10—is therefore not excessive.

Previous Occupations.—Labourer, 20; shops of various kinds, 9; fishermen, 7; schoolboy, 6; farm labourer, 5; clerk, 4;

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no occupation, 4; mercantile marine, groom, fitter, woodworker, each 3; butcher, gardener, cooper, motor mechanic, male servant, machinist, machine minder, greenkeeper, each 2; law apprentice, apprentice shipbuilder, apprentice engineer, apprentice bootmaker, baker, haulier, porter, school teacher, inventor, printer, fitters' labourer, policeman, tram-driver, tram-conductor, tramway-point boy, rancher, blacksmith, bonded storehand, wagon-builder, undertaker, shipwright, plumber, glass-blower, steel-worker, tobacco-worker, brass caster, weaver, each 1.

I have to thank Surgeon Rear-Admiral Sir W. W. Pryn, K.B.E., C.B., R.N., for permission to publish this article.

CLINICAL RECORD

NOTES ON A CASE OF DIFFUSE HYPERTROPHY OF THE BREASTS.

By B. SOUTAR SIMPSON, M.B., Ch.B. Ed., Lawson Memorial Hospital, Golspie.

THE following case was probably one of true diffuse hypertrophy of the breasts, although the extremely rapid growth towards the end, combined with the fact that the breasts gave the impression of being very vascular, raised a suspicion of malignancy :—

CASE.—Mrs M——, aged 32, a primipara, was three and a half months pregnant when she was admitted to the Lawson Memorial Hospital on 5th October 1919, complaining of great enlargement of both breasts and severe pain in the breasts.

History.—In September 1918, just over a year before admission to hospital, the patient noticed that her breasts were slightly enlarged. This statement was corroborated by her mother. She could not account for this, but as the condition caused her no inconvenience she took no further notice of it. The enlargement continued steadily but very slowly.

In February 1919 she was married, and in June 1919 became pregnant. No change in the rate of growth of the breasts occurred till the beginning of September 1919, when the enlargement suddenly became very rapid. Within three weeks the breasts had reached such proportions that she had much difficulty in walking. The skin over a small area on the under surface of each breast became broken, and she began to suffer from shooting pains in the breasts. This pain became worse, being especially severe at nights, and her sleep was much disturbed.

Her medical attendant, Dr Beard, Armadale, advised her immediate removal to hospital.

Menstruation commenced when the patient was 16 years of age, and continued regular and normal till her last period in June 1919. Her previous health had been excellent ; and there was nothing in the family history to note.

On admission to hospital the patient presented a distinctly toxic appearance—face flushed, tongue covered with a dirty brown fur, temperature swinging irregularly between 98° and 101° F., and the pulse rapid (100 to 120) and of poor volume. Her respiratory movements



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were considerably embarrassed by the great weight of the breasts, and she was scarcely able to walk. She complained, especially at nights, of spasmodic stabbing pains going right through the breasts to the back.

The breasts had reached an enormous size, as seen in the accompanying photograph taken a few days after admission. The right breast was slightly the larger. With the patient erect the breasts reached down to about three inches below the level of the pubes. The skin was tightly stretched, very rough in texture, and non-adherent. On the under surface of each breast over an area about the size of a crown piece, the skin was broken and badly infected. These raw, ulcerating areas were apparently the origin of the severe pain complained of at nights. The nipples were level with the skin surface and could only be identified on careful inspection. The consistence of the breasts was uniformly soft. No enlargement of axillary or clavicular glands was made out.

Treatment.—Attention was directed to supporting the breasts as well as possible and to dressing the infected areas. Full doses of potassium iodide were prescribed and administered without any benefit. Frequent doses of phenacetin and aspirin at first controlled the pain, but in a few days morphia had to be resorted to. The question of induction of labour was discussed, but in view of the general condition of the patient on admission it was decided that the risk was too great. Removal of the breasts by operation was in the circumstances quite out of the question.

Progress.—For the first week after admission there was a slight improvement in the condition of the patient. The breasts did not appreciably increase in size, and the ulcerating areas, though getting slowly larger, were much cleaner and more healthy in appearance. On the 13th and 14th of October, however, a very evident increase in size of the breasts was observed, and the enlargement continued at a tremendous rate. The surface veins became very much enlarged and prominent, and there was marked œdema. The skin over the entire under and inner aspects of each breast became bluish and then black, and in a few days sloughed completely. The consistence of the breasts was now very soft and boggy, and numerous firm, ill-defined masses could be felt in the substance of the organs.

The patient became completely exhausted. On the morning of the 19th October she became unconscious, and died on the following evening. Permission for a post-mortem examination was not obtained.

Diffuse hypertrophy of the breasts is a condition which is rarely seen in this country, though numerous cases have been described by foreign writers, mainly in Germany and Russia. The affection, as

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classified by Dearer and Macfarland,¹ may occur (*a*) in infancy, (*b*) in adolescence, or (*c*) at maturity.

Infantile hypertrophy is rare, and is associated with precocious sexual development rather than with disturbance of a trophic nature, as in the two other forms.

Separation into the categories *b*, the virginal or adolescent form, and *c*, the hypertrophy of pregnancy or maturity, does not seem to be necessary, as the causes are probably the same.

Although the literature on this subject is extensive, there are no definite statements made as to the cause of the condition. The following extracts will bear out this statement:—"Puberty and pregnancy generally precede the enlargement"; "Sudden cessation of the catamenia immediately precede the enlargement"; "The enlargement sets in suddenly, about the time of puberty or during pregnancy";³ "Puberty, pregnancy, and probably menstrual disorders are the only factors which exert any recognisable influence in the production of the disease";² "In some cases the occurrence of menstruation seems to act as a stimulus to the growth."¹

One half of the cases reported occur between the establishment of menstruation and the age of 18, the other half between 18 and 48 years. The period of growth varies greatly, from two and a half months to two years.¹ In the case of Mrs M—— the period of growth was definitely given by herself and by her mother as thirteen months. From the onset the hypertrophy progressed very slowly and uniformly for almost a year, and was not affected by marriage. The occurrence of menstruation seems to have had no effect on the condition, and the cessation of menstruation in her case was due to pregnancy. The sudden and rapid increase in the size of the breasts did not take place until after she had missed two periods.

As to the *Pathology*, the statement of Durston¹ that "Nothing was found but prodigious bigness," gives the best impression of the structure of the breast in true diffuse hypertrophy. In 240 cases collected from literature by Dearer and Macfarland, reference to pathology is made in 52. In 16 of these there is considerable doubt as to the real nature of the growth, and they are described as probably being fibro-adenomata. In 3 cases the enlargement was due purely to excessive formation of adipose tissue. Two cases are described as being carcinomatous (Lesage & Robin. — Lorrain), and Rouffart describes a "large-celled fibro-sarcoma."¹ The fact that malignant types of great bi-lateral enlargement have been described is interesting. In the case of Mrs M——, the extraordinarily rapid growth and the whole appearance of the breasts strongly suggested malignancy. Unfortunately the lack of a post-mortem examination leaves her case incomplete.

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No definite line of treatment has been laid down in such cases. Provided that the case is seen in an early stage, amputation of the breasts is recommended by many as affording the only chance of a cure. Others question the wisdom of such a procedure because in the first place the operation is severe and entails considerable risk, in the second place because in so many cases the breasts after labour spontaneously become more normal in size.

Billroth records cases where compression of the organs and free administration of potassium iodide were beneficial. Fraenkel tried the effect of mammary extracts and various internal secretions given internally, but with little success.

REFERENCES.—¹ Dearer and Macfarland, *The Breast, Anomalies, Diseases and Treatment*. ² John T. Finney, M.D., *Keen's Surgery*, vol. iii, p. 567. ³ *Encyclopedia Medica*, vol. vii.

CRITICAL REVIEW

THE VESTIBULAR APPARATUS.

Anatomy—Physiology—Methods of Examination—Relation to Neurological Diagnosis.

By J. S. FRASER, M.B., F.R.C.S. Edin.

A. ANATOMY.

THE membranous labyrinth is developed from the otic vesicle—a hollow ingrowth of epiblastic neuro-epithelium, which sinks into the mesoblast. Later the otic vesicle becomes differentiated into (1) the Pars Superior, or Static Labyrinth, consisting of the saccule, utricle, and the three membranous semicircular canals: to this part is attached the vestibular nerve and its ganglion. (2) The Pars Inferior, or Membranous Cochlea, with the cochlear nerve and its spiral ganglion. The mesoblastic tissue surrounding the otic vesicle forms the bony labyrinth which is embedded in the petrous portion of the temporal bone. The membranous labyrinth is filled with fluid (endolymph), and is surrounded by fluid (perilymph), which separates it from the endosteal lining of the bony labyrinth. From the point of view of comparative anatomy the static labyrinth, which is well formed in the cartilaginous fishes, is very much older than the auditory labyrinth.

1. *Pars Superior*.—The three canals lie in the three dimensions of space, and are known as (1) the horizontal, external, or lateral canal; (2) the superior vertical canal; and (3) the posterior vertical canal. The superior canal lies in a plane half-way between the frontal and sagittal. The posterior canal also lies in a plane half-way between the frontal and sagittal, but the canals are so placed that the superior canal of the right ear lies in a plane parallel to the posterior canal of the left ear. When the head is inclined thirty degrees forward from the upright position, the horizontal canal lies in a plane exactly parallel with the floor, while the vertical canals are at right angles to the floor. Each canal is dilated at one end into an ampulla which contains a small mound of neuro-epithelium called the crista. This mound is capped by the cupola, and is supplied by a branch from the vestibular nerve. The non-ampullated or smooth end of the horizontal canal leads directly into the vestibule, whereas the smooth ends of the superior and posterior canals unite in a common tube (*crus commune*) before opening into the vestibule.

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The sense organs of the internal ear are contained within the membranous labyrinth. The end organ is essentially a hair cell adapted to receive stimuli from movement of the endo-lymph impinging on the hairs. The utricle itself shows a layer of epithelium (macula) on the inner side of its external wall: the macula of the saccule is placed on the antero-internal wall of the cavity at right angles to the plane of the sensory epithelium in the utricle. The hair cells of the maculae are embedded in an otolith membrane. The nerve filaments from the utricle, saccule, and membranous canals pass through the vestibular ganglion in the internal auditory meatus, and unite to form the vestibular nerve. The eighth nerve, consisting of the cochlear and vestibular portions, enters the brain-stem at the junction of the pons and medulla, and immediately thereafter breaks up into its constituent parts.

B. PHYSIOLOGY.

For many centuries the individual was regarded as possessing only five special senses: sight, hearing, taste, smell, and touch. Lewis Fisher states that a great advance was made when the sixth sense—the so-called muscle-joint-splanchnic sense—came to be recognised. Recent studies of the internal ear, however, show that there is still another (seventh) special sense, the so-called “static” sense. This static sense has an end-organ for receiving stimuli, a conducting nerve for conveying sensations, and definite nerve tracts leading to brain centres where the stimuli are interpreted and translated into equilibration. The static portion of the internal ear is the end-organ of the seventh sense. The ear is not, however, the only sense organ concerned with the equilibratory function: sight and the muscular sense are also involved. Elliot Smith regards the cerebellum as an overgrown part of the vestibular nucleus. It co-ordinates the whole muscular system to perform orderly movements for the purpose of correcting disturbances of equilibrium.

The vestibular end organ may be divided into two portions: (1) static (saccule and utricle) for the maintenance of equilibrium; and (2) kinetic (utricle, saccule, and canals) for the recognition and analysis of motion. When the body is at rest, the otoliths by their pressure on the maculae give information as to the position of the body. Passive movements in a straight line, forwards, backwards, to the side, and also vertical movements (as in a lift), are probably detected by the maculae of the utricle and saccule. Rotation of the body causes movement of the endolymph in one or more pairs of semicircular canals. When the endolymph current is towards the ampulla the hairs on one side of the crista are put on the stretch,

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while if the current is away from the ampulla the hairs of the opposite side are put on the stretch. According to Jones and Fisher the hair cells on the two sides of the crista are connected with different central nuclei, so that the cells on one side produce diametrically opposite phenomena from those on the other. It is known that a current towards the ampulla in the horizontal canal produces twice as strong a reaction as a current away from the ampulla, and Shambaugh believes that there are more hair cells on one side of the crista than on the other. The only possible explanation of the phenomena which we observe after vestibular stimulation is that there is movement of the endolymph, *e.g.*, douching the ear with the head forward produces exactly the opposite effect from douching the ear with the head backward. It is not true, as some have held, that cold causes a depression and hot water a stimulation of the hair cells of the crista.

The vestibular fibres pass through the medulla and pons, *i.e.*, the brain stem. In the medulla the nuclei of Deiters and Bechterew, the triangular nucleus, and the nucleus vestibularis descendens receive some of the vestibular fibres. All the cranial nuclei concerned in nystagmus are located in the brain stem, *i.e.*, those of the third, fourth, and sixth nerves, along with the vestibular nuclei mentioned above. The posterior longitudinal bundles form the necessary connecting link between the vestibular and oculo-motor nuclei (see Figs. 1 and 2). The lateral limiting zone and the antero-lateral ground bundle play the same part in the spinal cord that the posterior longitudinal bundles play in the brain, and connect the vestibular nuclei with the anterior horn cells of the spinal cord. According to Ramsay Hunt these connections are responsible for the forced movements, disequilibrium, and the alterations of muscle tonus of labyrinthine origin. Fibres also pass to the nucleus of origin of the vagus nerve, and explain the nausea, vomiting, dyspnœa, and circulatory changes associated with disorders of the vestibular apparatus. In the white matter of the cerebellum the three vestibular nuclei—globosus, emboliformis, and fastigii—receive the vestibular fibres from the labyrinth. The fibres from the horizontal semicircular canals, according to Jones and Fisher, pass through the inferior cerebellar peduncles, while those from the vertical canals pass to the cerebellum through the middle peduncles. The inferior peduncles are also concerned with the synergic movement of the limbs, while the middle peduncles are probably concerned with synergy of the trunk. The superior cerebellar peduncles connect the two cerebellar hemispheres with one another, the fibres decussating in the upper portion of the pons. They are probably also concerned with co-ordinating the motor and sensory impulses of the cerebral cortex with those of the cerebellum. Jones and Fisher believe that the

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cerebellum supplies the necessary synergy for bodily movements. A cerebral cortical area supplies energy "in the rough." In order to carry out a definite movement more than one muscle has to contract if any degree of precision is to be attained. It is the function of the cerebellum to guide or synergise the energy supplied by the cerebrum. Accordingly we find that the cerebellar cortex contains various centres, e.g., an outward pointing, an inward pointing, an upward pointing, and a downward pointing centre for the upper extremity. When an individual desires to move his upper extremity downward and touch a certain point, the cerebral cortex supplies the energy, but the necessary precision is furnished by the cerebellum. The centres concerned in this particular movement would be the outward and inward pointing centres for the corresponding extremity. These two act against each other so that the arm is brought down in a perfectly straight line even when the patient's eyes are shut. Cerebellar cortical representation is believed to be homolateral, the right side of the cerebellum supplying synergy for the right side of the body. If one lateral lobe of the cerebellum is involved by a tumour or abscess, we find asynergic movements only in a limb or limbs on the same side. The various centres have been more or less mapped out on the upper and lower surfaces of the cerebellar hemispheres and in the vermis. Such symptoms of cerebellar abscess as hypermetria, adiadosokinesis, and tremor result from loss of synergy. If the superior lobe is affected the upper limb is involved, and correspondingly with the inferior lobe and lower limb. The cerebellar vermis governs the pelvic girdle muscles, and a lesion of the inferior vermis is suggested if, on pushing the patient backward, the pelvis does not move forward as it normally should. In the same way the superior vermis controls the shoulder girdle.

Vestibular Tracts.—Jones and Fisher state that, after entering the medulla, the vestibular portion of the eighth nerve divides into two tracts—(a) the fibres from the horizontal canal, and (b) those from the vertical canals. Each of these tracts divides into a Y, one arm of the Y eventually going to the eye muscles, and the other to the cerebellum (see Fig. 1). (a) The horizontal canal fibres enter Deiters' nucleus and here divide, the one tract passing through the nucleus triangularis toward the median line and entering the posterior longitudinal bundle. This tract connects with the oculo-motor nuclei. The other limb of the Y, from Deiters' nucleus, passes through the *inferior* cerebellar peduncle to the three vestibular nuclei. (b) The fibres from the vertical canals pass into the medulla, but instead of going to Deiters' nucleus they extend upward and, in the upper half of the pons, branch into the two arms of the Y. One arm enters the posterior longitudinal bundle and goes to the oculo-motor nuclei, while the other arm

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of the Y enters the cerebellum through the *middle* peduncle, and is distributed to the three cerebellar nuclei. The fibres passing to the oculo-motor nuclei are concerned with the production of nystagmus, while those passing to the cerebellum, after a relay, are continued on to the cerebrum, and are concerned in the production of vertigo.

Vestibular nystagmus is a rhythmic associated movement of the eyes, and consists of a slow movement of the eyes in one direction followed by a quick return in the opposite direction. The slow movement, or component, of the nystagmus is the one produced by ear-stimulation. The recovery, or quick component, is of cerebral origin. It is perhaps unfortunate that the direction of the nystagmus has been named according to the direction of the quick component, *i.e.*, nystagmus to the right means that the quick (cerebral) jerk is to the right, while the real vestibular component is the slow return to the left. A patient with nystagmus to the right is requested to look at an object on his right side. The vestibular pull causes the eyes to deviate to the left. The cerebrum, however, recognises this and sends impulses which bring about the quick return to the right, and so on. Under the influence of an anæsthetic the cerebral component of vertigo is eliminated, and the slow, or vestibular, movement alone takes place and results in conjugate deviation.

C. METHOD OF EXAMINATION.

A careful history of the case must first be taken as regards:—
(1) Deafness; duration, mode of onset, and supposed cause. (2) Tinnitus; duration, character of the noises. (3) Dizziness; duration, severity, mode of onset, effect of sudden changes in the position of the head: was the dizziness associated with nausea and vomiting? Are the attacks periodic and are they associated with any known cause? (4) Staggering; was this sufficiently severe to cause falling? To which side did the patient tend to fall? The family history should also be noted and the question of venereal disease inquired into. The condition of the nose and throat must be investigated. *Co-operation with the neurologist is of the greatest importance.* The ear is then inspected in the usual way and the condition of the drumhead noted. The hearing is next examined by the tuning-fork tests, the watch, the human voice, and the monocord, but these go beyond the scope of the present abstract.

Vestibular Apparatus.—Spontaneous nystagmus.—The patient is told to look straight forward and then to follow the finger of the examiner held two feet away and moved to the right and left and also up and down. Spontaneous nystagmus in any of these positions is noted. In order to have a good view of the eyeball the upper lid

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may be raised by the thumb of the examiner. *Spontaneous vertigo*.—The patient is asked whether he is dizzy and whether he has any sensation of turning in a definite direction, or whether he feels that the outside world is revolving. *Spontaneous pointing*.—(See later). *Spontaneous falling* (Romberg test).—The patient stands with heels and toes together and eyes closed, and the direction of any swaying or falling is noted. The patient is now asked to turn his head sharply to the right or left, and any change in the direction of falling is noted. The examiner now grasps the shoulders of the patient and attempts to overthrow him either to one side or the other, forward or backward. The patient is told to balance himself so that he will not fall. When the shoulders of the patient are pressed towards the right the pelvis should sway toward the left in the attempt to maintain equilibrium. A refined method of testing the tendency to fall is provided by the goniometer—a platform which may be tilted at the will of the examiner.

Rotation (Bárány).—For this test a special turning chair is advisable, in which the patient sits with his head immediately over the axis of turning. A head bracket may be attached to retain the patient's head in the required position. At the back of the chair there is a rod for turning. The base of the chair is heavy so that the whole structure is secure. The patient is placed in a turning chair with his head in the upright position, *i.e.* inclined 30° forwards, and is rotated at the rate of ten complete revolutions in twenty seconds. At the end of the tenth turn the rotation is suddenly stopped, and the duration of the resulting nystagmus is measured by a watch. When the head is in the erect position the rotation affects only the two horizontal canals, as they alone are in the plane of rotation. At the beginning of rotation to the right the endolymph in the right canal, in virtue of its fluid inertia, flows towards the ampulla, relatively speaking: in the left canal the fluid flows away from the ampulla. As the rotation is continued, the endolymph catches up with the movement of the canal wall until it rotates at the same rate. If now the rotation of the individual be abruptly stopped, the movement of the endolymph will continue, but its flow relative to the ampulla will be in the reverse direction to what it was at the beginning of rotation. In order to understand the movements of the endolymph and cristæ, we have only to think of what occurs in an Edinburgh tramcar—especially on a wet day. When the car starts suddenly, all the passengers are violently jerked backwards, but, as the car goes on, they again assume an upright position, and maintain it until the car stops suddenly, when they are all jerked forwards. The cristæ of the membranous canals correspond to the passengers.

Nystagmus produced by suddenly stopping the rotation of a patient is known as “after-nystagmus.” The duration of the horizontal “after-

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nystagmus" in a normal individual, due to rotation with the head erect, is from fifteen to thirty seconds, usually about twenty-four seconds. The laws of nystagmus are as follows (Bárány):—I. Each pair of canals induces nystagmus in its own plane. II. Nystagmus, due to rotation, corresponds to the line of intersection of the horizontal plane with the cornea. To test the vertical canals the head is bent forward a hundred and twenty degrees, but, for practical purposes, ninety degrees is quite sufficient. At the end of twenty seconds' rotation, the patient's head is lifted and the resulting rotatory nystagmus noted. Another method is to turn the patient with his head tilted sixty degrees backward. This produces exactly the opposite kind of nystagmus to the foregoing. To produce a vertical nystagmus, the patient is rotated with his head inclined towards one or other shoulder. In the abstractor's opinion the vertical canals are best tested—at least so far as rotation is concerned—by bending the patient's head forwards and to the right so that the lambda approximates to the right shoulder. This tests the posterior vertical canal on the right side and the superior vertical canal on the left side as these two canals lie on parallel planes which in this position are also parallel to the floor. In a similar way if the patient be rotated with his head bent forward and to the left, so that the lambda approximates to the left shoulder, the two remaining vertical canals—the posterior canal on the left side and the superior canal on the right side—will be brought into the horizontal plane.

Vertigo after Turning.—The patient, with eyes closed, is turned to the right at a speed of one second for each turn, and is asked to keep on telling the examiner in which direction he is being turned, e.g. "to the right," "to the right." After ten turns the chair is stopped and the patient immediately says "to the left." The duration of this feeling of turning to the left is measured with a stop watch.

The Pointing Test.—Orientation means the determination of the relation of the body to space, while equilibration means the maintenance of position whether walking, standing, or sitting. Pointing is a voluntary act by which the patient indicates his sense of orientation. The normal person is always aware of the location of his hand or finger in space and, with his eyes closed, is aware of the exact position of objects previously located with the finger. In carrying out Bárány's pointing test, the patient is seated and the examiner stands opposite to him. The patient shuts his eyes and extends one upper extremity with three fingers and thumb closed but the forefinger pointing forwards. The examiner also extends his hand and brings one forefinger below and in contact with that of the patient. At the word "Up" the patient raises his arm to the vertical position, and then immediately brings it back again to touch the examiner's

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finger. In the same way downward and lateral pointing may be tested. Further, the accuracy of pointing at the elbow and wrist joints and also in the joints of the lower extremities may be investigated: even the pointing reaction of the head and trunk may be examined, but, as a rule, only the reactions of the upper extremities are tried.

When the normal pointing reactions have thus been investigated, the vestibular apparatus is stimulated either by rotation or the caloric test, and the resulting effect on the pointing reaction is noted. For example, after rotation to the right has been suddenly stopped, the patient feels that he is turning to the left. He therefore makes what he thinks is an appropriate correction and so past-points to the right. Jones and Fisher point out that this past-pointing is *not an ear reaction*. Ear-stimulation produces only nystagmus and vertigo. Pointing is a voluntary motor act and the pointing error is due to the vertigo. If there is no vertigo there is no past-pointing, *i.e.*, past-pointing is a secondary manifestation of vertigo. The patient tries to find the examiner's finger at the point at which he conceives it to be. After the rotation to the right has stopped, the patient feels that he is turning to the left. He therefore deliberately points to the right. After practice, an intelligent patient is able to allow for the error. The duration of the past-pointing and of the vertigo are the same, *i.e.* about twenty-six seconds after the rotation has stopped. Turning to the right, with the head back sixty degrees, and with the head forward a hundred and twenty degrees, both produce past-pointing to the right. These two experiments, however, produce diametrically opposite stimuli as far as the cerebellum is concerned, and the past-pointing to the right occurs in both cases because the cerebral centres receive the same impression that the body is turning to the left. Past-pointing can occur in the three planes of space—horizontal, frontal, and sagittal. The plane of the past-pointing is always in the plane of the vertigo producing it, while the direction of the past-pointing is opposite to the direction of the vertigo.

Falling Reaction.—The phenomenon of falling after ear-stimulation may be regarded as a "past-pointing" of the entire body. The patient falls because of the vertigo. After rotation with the head upright, the subjective sensation of vertigo is in the horizontal plane, and the individual feels that he is being rotated on his own vertical axis, as after waltzing. There is therefore no tendency to fall. If, however, the subjective sensation is one of turning in the frontal plane, *e.g.* after rotation with the head bent sixty degrees backward, the individual tends to fall to one side or the other. If the subjective sensation is one of movement in the sagittal plane, he tends to fall either forward or backward. Under all circumstances both the

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past-pointing and the falling are always in the direction of the slow component of the nystagmus, *i.e.* the direction of the endolymph movement.

Caloric Test.—The advantage of the caloric test is that each ear can be tested separately. For the cold caloric test, water at 68° F. should be used: for the hot caloric test water at 112° to 115° F. should be employed. The douche-can containing the water is placed approximately two feet above the ear to be douched. An ordinary ear nozzle is attached to the tubing from the douche-can. The patient's head is tilted thirty degrees forward. At the instant at which the douching is started the stop-watch is clicked. The douching is carried out by the examiner, while an assistant takes charge of the stop-watch and observes the onset of nystagmus. The douching is continued five or ten seconds after the first appearance of nystagmus. The pointing and falling tests are then carried out. Cold syringing of the right ear causes a downward current in the endolymph from the superior canal to the utricle and gives rise to rotatory nystagmus to the left—the slow or vestibular component being directed to the right. If now the head be tilted so that the eyes look to the ceiling, the horizontal canals become vertical and the former rotatory nystagmus immediately becomes horizontal.

Electrical Test.—The galvanic test affects the entire labyrinth and the eighth nerve, and its importance is found in the diagnosis of tumours of this nerve. In destruction of the labyrinth due to labyrinthitis and also in tumours of the eighth nerve (cerebello pontine angle tumour) we usually have deafness, nystagmus, and vertigo with loss of caloric reaction. In the former case (labyrinthitis) the vestibular nerve is still intact and electrical stimulation produces normal or almost normal responses. In tumours of the eighth nerve, however, the vestibular nerve itself is involved and does not react, to galvanic stimulation.

Mackenzie states that in making the galvanic test, certain essentials are required: (a) A suitable electrical apparatus with clean contact points. (b) An accurate milliamperemeter. (c) A reversing switch under the control of (d) a capable assistant who controls the polarity the amount of current, and observes the milliamperemeter. (e) Two electrodes, one about two inches square and flat, and the other a small ball electrode about a quarter of an inch in diameter. Both electrodes should be wrapped in moist cotton or gauze soaked in saline solution. The patient is first of all tested for spontaneous nystagmus. The large flat electrode is held by the patient—it does not signify in which hand. The patient's head is tilted slightly backward to permit of better observation of the eyes, while he is directed to look straight ahead. The examiner elevates the upper eyelid with the

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thumb of one hand while applying the ball electrode with his other hand to the tragus so as to push it into the external canal. The moment a reaction is observed the assistant is notified and calls back the polarity and announces the milliamperemeter reading, when a record is made. As a result of some thousands of experiments Mackenzie is led to conclude that the normal reaction from the combined inner ear and nerve is: Right ear—Kathode 4 ma., nystagmus to the right. Anode 4 ma., nystagmus to the left. Left ear—Kathode 4 ma., nystagmus to the left. Anode 4 ma., nystagmus to the right. The galvanic reaction is explained as follows—tonic impulses from the right ear continually tend to draw both eyes to the left. If we apply the anode to the right ear we depress the function of this ear and there results a drawing of both eyes to the right with consequent nystagmus to the left. The kathode has the opposite effect.

Bourgeois states that, if in a normal individual the two poles of a continuous current are applied—one in front of each ear—it is noticed that there is an inclination of the head and trunk towards the positive pole when the current reaches a sufficient strength—usually from 6 to 8 ma. The patient stands with heels together and eyes shut, while the observer stands in front and places the electrodes in front of each tragus. An assistant gradually increases the current until the reaction is obtained, and then diminishes the current to zero. During the flow the patient experiences a feeble vertigo with a lateral impulse towards the positive pole—an impulse which it seems practically impossible to resist. A stronger current produces nystagmus, but the test then becomes rather painful. In hyperexcitability of the labyrinth the reaction is obtained with less than the usual number of amperes. Further, the patient also feels very giddy for some time after the current has been stopped. In normal cases the vertigo ceases instantly. In hypo-excitability even 15 ma. fail to produce the slightest vertigo, while in some cases, of course, no reaction at all can be produced. In recent lesions of the labyrinth the patient tends to fall towards the affected ear whatever the direction of the current may be. Thus, in pathological conditions electricity exaggerates the spontaneous impetus.

D. RELATION TO NEUROLOGICAL DIAGNOSIS.

The ophthalmologist is frequently asked by the physician or neurologist for his opinion regarding the condition of the ocular fundus in renal and vascular conditions, intracranial lesions, and toxæmias of various origin. The aurist, however, is seldom consulted in cases of vertigo.

Jones states that the examination of (certain) neurologic cases is

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not complete without a report from the otologist as to the condition of the vestibular apparatus. In many instances the symptoms of inner ear disturbance and of a cerebellar lesion are identical. Nystagmus and vertigo, with loss of equilibrium, associated perhaps with nausea and vomiting, may be produced either by a disturbance of the internal ear or by an intracranial lesion. Functional examination of the ear, however, will probably clear up the diagnosis. The aurist sends in a stimulus to the brain centres and notes the responses of different parts of the body. If the ear and vestibular nerve paths are intact all the normal responses will appear. If, however, there is a failure of any of the responses it is positive evidence of interruption along that particular path. In order to obtain reliable results it is essential that the technique of examination should be accurate.

Graef asks if we are to be content in the future to make the old guess-work diagnosis of gastric, cardiac, hepatic, or essential vertigo. He suggests that it would be better first of all to make sure of the integrity of the static apparatus by modern methods. Vertigo may be due to a great variety of causes. Apart from such conditions as seasickness, aeroplane and railway sickness, which are mainly due to vestibular irritation, the causes of vertigo may be classified as follows:—

(1) Injury, as in blows or falls on the head, glancing bullet wounds in the neighbourhood of the ear, shell explosions and fracture of the cranial base. The abstractor has found that the pathology of deafness, tinnitus and giddiness following shell explosion, is probably to be explained by hæmorrhage in the internal auditory meatus. (2) Hæmorrhage into the labyrinth in bleeding diseases. This is proved by microscopic examination. It is possible that labyrinthine hæmorrhage may also occur in acute febrile conditions, but so far this is only guess-work. (3) Toxæmia or toxic neuritis. This may be either temporary, *e.g.* alcohol and tobacco, or more lasting, as in cases of dental caries with pyorrhœa, prolonged toxic absorption from septic tonsils, nasal accessory sinus suppuration, intestinal stasis, appendicitis, etc. Neuritis of the eighth nerve may also be due to exposure to cold, as from a cold wind blowing on the ear. In the abstractor's experience this gives rise to lesion of the eighth nerve, whereas the ordinary infectious nasal catarrh (coryza) causes otitis media. The polyneuritis cerebrolis Menièriformis of Frankl-Hochwärt probably comes into this group. (4) Middle ear suppuration, involving the labyrinth, especially the so-called "labyrinth fistula" in chronic suppurative otitis media with cholesteatoma. Manifest and latent labyrinth suppuration. (5) Ocular lesions. (6) Vascular disorders, especially arterio-sclerosis. (7) Meningitis. Formerly the view was taken that deafness and giddiness, associated with many infectious

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diseases, were due to toxic neuritis or to septic embolism of the internal auditory artery. The opinion of many modern otologists inclines to the view that lesions of the vestibular apparatus and inner ear in cases of syphilis, pneumonia, mumps, measles, and even osteomyelitis are due to the spread of a basal meningitis to the auditory nerve and labyrinth, the meningitis itself resulting from a blood infection. (8) Lesions of the brain itself, *e.g.* abscess, hæmorrhage, thrombosis, encephalitis, gumma, multiple sclerosis, tumours.

Jones and Fisher hold that a peripheral lesion of the labyrinth or eighth nerve is suggested by:—(1) Impairment of both cochlear and vestibular functions. (2) Tinnitus. (3) Proportionate impairment of the responses from the horizontal and vertical canals. (4) Proportionate impairment of both nystagmus and vertigo.

A central lesion is suggested by:—(1) Normal cochlear, with impairment or loss of vestibular, function. (2) Normal response (nystagmus) from the horizontal canals, but loss of response from the vertical canals, or *vice versa*. (3) Normal vertigo, but impaired nystagmus from the horizontal canal, or *vice versa*. (4) Normal vertigo, but impaired nystagmus from the vertical canals, or *vice versa*. (5) Normal vertigo and nystagmus from any pair of canals, but impaired past-pointing or falling reaction. (6) Spontaneous vertical nystagmus (this is pathognomonic of a central lesion, and indicates involvement of the brain stem either by infiltration or pressure). (7) Spontaneous nystagmus to the right and loss of vestibular response in the right ear. (If the right labyrinth itself were the cause of the trouble the nystagmus would be to the left.) (8) Spontaneous nystagmus of increasing intensity or of long duration. (Nystagmus due to a lesion of the labyrinth rapidly diminishes and disappears within from three to ten days.) (9) Perverted or inverse nystagmus indicates a brain stem involvement, *e.g.* douching the right ear with cold water, with the head back sixty degrees, stimulates the right horizontal canal, and should produce a pure horizontal nystagmus to the left. If we get a vertical nystagmus, a rotary, oblique, or mixed nystagmus, it may be spoken of as "perverted." If, instead of a horizontal nystagmus to the left, there is produced a pure horizontal nystagmus to the right, it may be termed an "inverse" nystagmus. Neither a perverted nor an inverse nystagmus can possibly be produced by a lesion of the labyrinth or eighth nerve. (10) Conjugate deviation of the eyes instead of nystagmus as the result of ear-stimulation.

According to Fisher, the first question in any given case is, Are we dealing with a functional or an organic condition? If all responses to ear-stimulation are perfectly normal, a functional condition may be suspected. A definite impairment of even one response shows that we are dealing with an organic lesion. Our next problem is to

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determine whether the case is one of peripheral or central lesion. In a peripheral lesion *all* the responses are impaired, and, conversely, the presence of any *one normal* response to stimulation indicates a normal labyrinth and eighth nerve. If the findings lead to the conclusion that the lesion is central the simplest method of procedure is that of elimination. We begin with the labyrinth and proceed brainward, considering each structure by itself. (*a*) With good hearing, and one or more normal responses from the static-kinetic portion of the labyrinth, the labyrinth itself and eighth nerve are to be considered uninvolved. (*b*) For information relative to the condition of the medulla oblongata and *inferior* cerebellar peduncles we examine the responses obtained on stimulation of each horizontal canal *separately*. The test is performed by tilting the head back sixty degrees after douching. If this produces normal horizontal nystagmus and vertigo, with past-pointing and falling, the medulla oblongata and inferior cerebellar peduncle of that side may be considered uninvolved. (*c*) To determine the integrity of the pons we examine the responses obtained from stimulating the vertical semicircular canals. These are tested when the ear is douched with the head thirty degrees forward—the so-called “upright” position. If a normal rotary nystagmus results, with vertigo, past-pointing, and falling, it suggests uninvolved pathways in the pons and middle cerebellar peduncle of the side douched. (*d*) The cerebellum is considered as not the seat of any gross lesion if stimulation of either ear or any canal produces past-pointing of both arms in both directions. (*e*) When the tests of *all* the semicircular canals of both sides produce impaired or absent vertigo it is reasonable to suppose that there is *one* lesion located at a point where *all* the fibres concerned in vestibular vertigo come together, *i.e.* the decussation of the superior cerebellar peduncles. (*f*) With no response at all from the right ear, and an absence of response from the vertical canals of the left ear, it is reasonable to explain the whole “phenomenon-complex” by one lesion in the right cerebello-pontine angle, where a tumour of the right eighth nerve would prevent response from the right labyrinth and, by pressure against the brain-stem, would interfere with the responses from the vertical canals of the opposite side.

Examples (see Fig. 1).—(1) If stimulation of the right ear produces no nystagmus, vertigo, past-pointing, or falling, there is obviously a destruction of the labyrinth or eighth nerve. We would, of course, have complete deafness of this ear. (2) Stimulation of the right horizontal canal produces:—nystagmus, none; vertigo, normal; past-pointing, normal; falling, normal—this suggests a lesion in the medulla oblongata between Deiters' nucleus and the posterior longitudinal bundle on the right side. (3) When stimulation of the right horizontal canal produces:—nystagmus, normal; vertigo, none; past-pointing,

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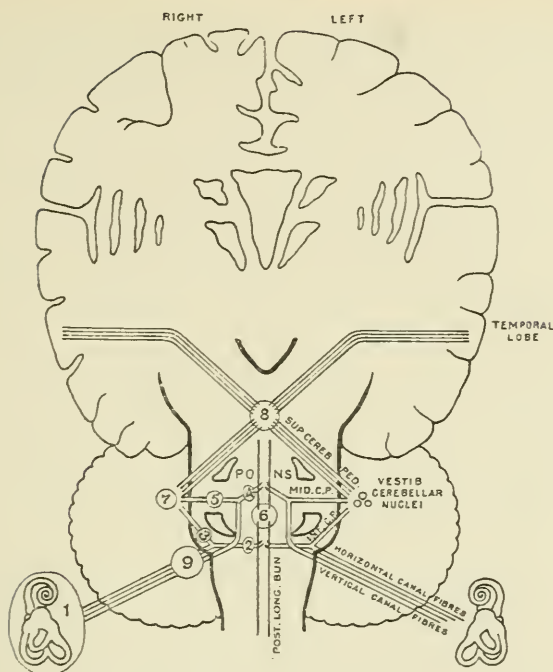


FIG. 1 (after Fisher).—Brain looked at from below and front. On left side of brain paths of fibres from horizontal and vertical canals are shown; on right side of brain situation of various hypothetical lesions.

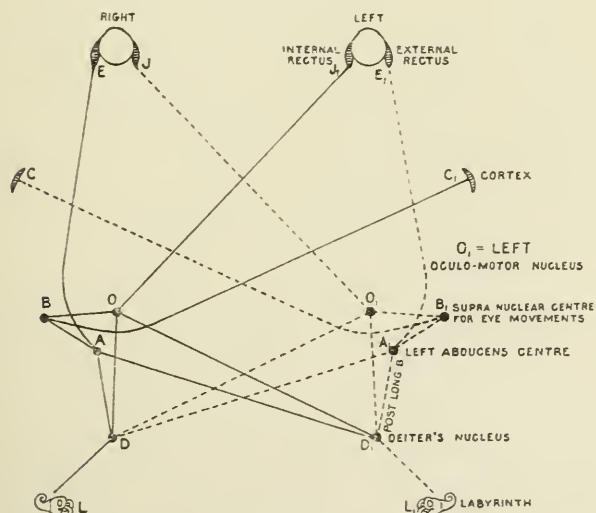


FIG. 2 (by permission of Editor of *Journal of Laryngology, Rhinology, and Otology*).—Diagram shows mechanism of Vestibular Nystagmus.

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none; falling, none—it suggests a lesion of the right inferior cerebellar peduncle. (4) When stimulation of the right vertical canal produces:—nystagmus, none; vertigo, normal; past-pointing, normal; falling, normal—it suggests a lesion in the posterior portion of the pons near the posterior longitudinal bundle on the right side. (5) When stimulation of the right vertical canals produces:—nystagmus, normal; vertigo, none; past-pointing, none; falling, none—it suggests a lesion of the right middle cerebellar peduncle. (6) When stimulation of *all* canals of *both* ears produces:—nystagmus, none; vertigo, normal; past-pointing, normal; falling, normal—it suggests a lesion of the posterior longitudinal bundles themselves. (7) When stimulation of *all* canals on the right side produces:—nystagmus, normal; vertigo, none; past-pointing, none; falling, none—it suggests a lesion of the cerebellar vestibular nuclei of the right side. (8) When stimulation of *all* the semicircular canals of *both* ears produces:—nystagmus, normal; vertigo, none; past-pointing, none; falling, none—it suggests a lesion at the base of the cerebral crura at the point of decussation of the two superior cerebellar peduncles. (9) When right ear is totally deaf and stimulation of its semicircular canals produces:—nystagmus, none; vertigo, none; past-pointing, none; falling, none—and stimulation of the left horizontal semicircular canal produces the only normal reactions on that side, the lesion is located in the right cerebello-pontile angle. The failure of the vertical canals on the left side to produce the normal response is due to pressure by the tumour on the pons. Jones has noted crossed past-pointing in these cases, *i.e.*, persistent past-pointing of both upper extremities, either outward or inward, regardless of the type of ear stimulation employed. Fisher admits that, when confronted with actual pathologic cases of intracranial involvement, the findings may be obscured by pressure phenomena. (The various lesions noted above, 1-9, are marked on the diagram, Fig. 1.)

As an example of the value of vestibular examination the following case of Ruttin's may be quoted:—A child of two years received a head injury from a fall on the edge of a table. After this the mother noticed that the eyes were always turned to the right and that movement to the left appeared impossible. Conjugate deviation to the right combined with paresis of movement to the left might be due to a lesion (see Fig. 2) of the nuclei O_1 and A_1 with degeneration of the paths $J E_1$. Since, however, cold irrigation of the left ear induced a slow movement of the eyes to the left, the paths $L_1 D_1 A_1 E_1$ and $L_1 D_1 O_1 J$ must be functional and thus a nuclear lesion on the left side could be excluded. Further, since nystagmus to the right followed this slow movement to the left, and since the quick component of the nystagmus, according to Bárány, has its origin in the contralateral centre for the eye movements (in this case on the right side),

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the routes $L_1 D_1 A E$ and $L_1 D_1 O J_1$ together with their continuations $B A$ and $B O$ must also be intact, the more so because the nuclei A and O , when stimulated by cold irrigation of the right labyrinth, accentuated the spontaneous deviation of the eyes to the right. Thus the vestibular stimulus along the paths $L D A E$ and $L D O J_1$ remained unimpeded. On the other hand the quick component of the nystagmus to the left was entirely absent after cold irrigation of the right ear. Since this component is dependent on the integrity of the route $L D A_1 E_1$ and $L D O_1 J$ and their connection with the contra-lateral eye movement centre B_1 the lesion could only be situated between $B_1 A_1$ and $B_1 O_1$, *i.e.*, it was a supranuclear lesion between the oculomotor nucleus and the centre for eye movement. A subcortical lesion between B_1 and C_1 could be excluded because it would have prevented only the intentional movement of the eyes to the left and would not have interfered with the quick component resulting from cold irrigation of the right ear. Recovery was slow especially on the left side.

Sachs sounds a note of warning regarding the value of the vestibular tests. He states that the pathways connecting the vertical semicircular canals with a nucleus in the pons has as yet no anatomic proof, nor has the pathway which controls past-pointing—the cerebro-cerebellar-pyramidal tract—ever been seen. The neuro-otologist claims by his tests that he can place a lesion in these tracts. A number of cases which Sachs has seen show the danger of such a conclusion, for in these the mechanism controlling the vertical canals did not, while that of the horizontal canals did, react. It therefore seemed probable that there was a lesion in the pons. Subsequent operation showed that these cases had internal hydrocephalus, and that the dilatation of the ventricles had pressed on the pathways passing from the pons. Sachs admits that this might be interpreted as proof that the pathway of the vertical canals lies in the pons. It shows unquestionably, however, that a diffuse process like a hydrocephalus can give abnormal vestibular reactions. Sachs holds that the neuro-otologists have gone so far ahead of the anatomists and physiologists that they are in the same position as infantry unsupported by heavy artillery. If all other findings are negative, Sachs is never willing to subject a patient to operation on the strength of abnormal vestibular reactions.

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NEW BOOKS

Dementia Præcox and Paraphrenia. By Professor KRAEPELIN.
Translated by R. Mary Barclay, M.A., M.B. Edited by
George M. Robertson, M.D., F.R.C.P. Pp. x. + 331. Edin-
burgh: E. and S. Livingstone. 1919. Price 15s. net.

Those engaged in the study of mental diseases in this country are under a debt of gratitude to the translator of this work in so much as the translation fills a much-felt want in the literature on dementia præcox hitherto available to the English reader. Owing to the varied views held regarding the disease, to the complexity of its symptomology, and to the indefiniteness of its delimitation from other mental disorders, some even yet questioning its existence as a separate entity, it has proved for many a condition of which it was not easy to form a clear conception. If Kraepelin's work does little to clear up many of the difficult questions connected with the disease we can now, at any rate, study the picture as it appears to one who is as yet the most authoritative writer on the subject.

Kraepelin, it appears, agrees with Bleuler in the latter's view, that the clinical picture is made up of, firstly, the "fundamental disorders," and secondly, the "accompanying phenomena." From this standpoint the weakening of judgment, of mental activity, and of creative ability, the dulling of emotional interest, the loss of energy, and the loosening of the inner unity of the psychic life are fundamental, while the varied mass of other symptoms such as negativism, stereotypy, states of excitement, and so on, are accompanying phenomena, the variety in the manifestation of which is as yet unexplained, though some cause may be looked for in the local extension of the morbid process, or in the individual development of the psychic personality. In any case, no one symptom is of special importance. It is the clinical picture as a whole which must be examined, and in it the fundamental symptoms only are constant.

Dementia præcox, although essentially a disease of the developmental period, is not confined solely to it. In a certain number of cases it develops in the later decades—even, Kraepelin claims, up to the sixth. Its course, though irregular, is in the main definite and progressive, but while complete and lasting cures are rarities, if they exist at all, in quite a number of cases there are periods of partial improvement or even complete recovery which last for, in some cases, many years. In his series of cases of improvement, Kraepelin classifies 12.6 per cent. as for the time being completely recovered.

The recognition of these facts enables one to take a rather more hopeful view of the condition than the earlier teaching lead to, and

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further, if there is a definite morbid process affecting the second and third cortical layers, and that in certain areas—the frontal, central convolutions, and temporal lobes—and if as seems probable, the cause lies in the presence of an auto-intoxication due to a disorder of metabolism, there is hope that further investigation may bring to light more definite means of combating the disorder than are at present in our possession. As Kraepelin however points out, these views regarding the morbid processes and the etiology still await confirmation.

The clearness of the description makes the work pleasant to read, and this is enhanced by the temperateness of the arguments and the breadth of the views taken. Only in one instance does the author become really emphatic, and that is in his refutation of the Freudian theories of etiology with which he disagrees in a wholehearted manner. He characterises the analyses coming from the Zurich school as showing everywhere “the characteristic fundamental features of the Freudian trend of investigation, the representation of arbitrary assumptions and conjectures as assured facts which are used without hesitation for the building up of always new castles in the air ever towering higher.”

Cerebro-spinal Fluid. By ABRAHAM LEVINSON, B.S., M.D., with a Foreword by Ludvig Hektoen, M.D. Pp. 231. With 56 Illustrations. London: Henry Kimpton. 1919. Price 18s. net.

In this volume the author has supplied a distinct contribution to Medical Literature. The subject is treated in a most systematic and complete manner. The opening chapters are devoted to a concise history of cerebro-spinal fluid and the methods of obtaining it. He then proceeds to deal in a very lucid fashion with the essential anatomy and physiology of the cerebro-spinal system. This portion of the volume is written from an exceptionally practical point of view, and although the controversial points are dealt with, the reader is not left confused as to which interpretation best conforms to the evidence available. A considerable portion of the book is devoted to a description of the properties of the normal cerebro-spinal fluid. Not only are the various physical characteristics described very carefully, but also the chemical and enzyme properties are outlined in detail. Of necessity, the greater part of this volume is devoted to pathological characteristics of the cerebro-spinal fluid in disease. This is roughly divided into four sections. The first deals with the pathological changes which should be looked for. The second outlines in considerable detail the various methods which may be employed to determine pathological conditions. The third section is devoted to a detailed analysis of the various attributes of the cerebro-spinal fluid in different diseases, while the fourth section deals with the technique and indications of intraspinal treatment.

To each chapter there is appended a very complete bibliography

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of the subject-matter dealt with, which affords a comprehensive review of the cerebro-spinal fluid and brings the knowledge of the subject up to date.

This volume is of particular value when one considers the great advances which have been made during recent years in the examination of the cerebro-spinal fluid for both diagnostic and prognostic data, and it is the first comprehensive book which deals with all phases of cerebro-spinal fluid. One interested in the subject will find this volume of particular value, not only in regard to the valuable material which it contains, but also as a book of reference.

Roentgen Interpretation: A Manual for Students and Practitioners.

By GEORGE W. HOLMES, M.D., and HOWARD E. RUGGLES, M.D. Pp. 205. With 181 Illustrations. London: Henry Kimpton. 1919. Price 15s. net.

This book is written for those in need of a guide to the interpretation of radiographs, and in addition to being well illustrated, contains full lists of references to recent literature on the subject. The chapter dealing with the stomach is interesting and helpful, because of carefully-prepared tracings of the organ showing its appearance in ulcer and malignant disease as is usually seen in screen examination.

The authors are right in stating that a knowledge of pathology is as necessary to the radiologist as anatomy to the surgeon. It is well to emphasise this point, for the most complete X-ray examination has only succeeded in demonstrating the presence of certain pathological conditions in the living, in a more or less imperfect way.

On the whole the book is a good one; its defects are those inseparable from the attempt to get a systematic treatise into small compass. Its main virtue, however, is, that it is sound.

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Internal Medicine: A Work for the Practising Physician on Diagnosis and Treatment, with a complete Desk Index. By NATHANIEL B. POTTER, M.D., and JAMES C. WILSON, M.D. Fifth Edition, in four volumes. With 441 Illustrations. Philadelphia and London: J. B. Lippincott Co. 1919. Price £3, 15s. net.

These volumes contain almost everything a practitioner requires to know regarding the diagnosis and treatment of diseased conditions. Practical rather than theoretical considerations are constantly kept in view both on its laboratory and clinical side, and hence unsettled questions are passed over which might quite properly be addressed to a purely scientific audience.

The first volume is taken up with a description of the principles

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which guide one in diagnosing disease and the methods employed to serve this end. These are elaborate and exhaustive, including the examination of the blood, urine and sputum by the most recent methods and there is added a short but useful chapter on help got from examination by means of Röntgen rays. Then follows a section on the signs and symptoms of disease in general, with special chapters on acidosis, functional tests, serology and serum sickness.

The second volume is occupied with the clinical application of these principles and methods, and the diagnosis of the diseases of the different systems is taken up in detail. As scientific medicine advances, diseases which were formerly treated as independent entities are gradually being allocated to their proper place in a scientific classification and hence we have a chapter devoted to deficiency diseases, which includes beriberi, scurvy, infantile scurvy, pellagra, and rickets.

The third volume is devoted entirely to treatment, and throughout it emphasis is laid on the importance of mechanical, climatic and other extra medicinal methods, while the applicability of drugs, their advantages, disadvantages, and limitations is also discussed.

The different chapters in the book are well and clearly written—neither too elaborate nor too sketchy—and the whole forms a most excellent compendium of reference, while the elaborate and accurate index (which forms the fourth volume) makes it exceedingly easy to find any point one wishes elucidated.

The Nature of Enzyme Action. By W. M. BAYLISS, M.A., D.Sc., F.R.S. Fourth Edition. Pp. viii. + 190. With 9 Illustrations. London: Longmans, Green & Co. 1919. Price 7s. 6d net.

Professor Hopkins and Dr Plimmer were indeed fortunate when they secured Professor Bayliss as first contributor to their series of monographs on biochemistry. The earlier volumes were intended to deal with general aspects of the subject, and accordingly *The Nature of Enzyme Action* contains no detailed description of the many known specific enzymes, but deals rather with general properties, more or less common to all. Details must be sought in the larger compilations by Effront, Green, Oppenheimer and others. In spite of the appearance of Euler's *Allgemeine Chemie der Enzyme*, Bayliss' book remained pre-eminent in its particular province; during the last decade it has seen four editions and has nearly doubled in size. The present edition has been brought up to date by the addition of new references and the important chapter on the mode of action of enzymes has been rewritten, but otherwise there is not much change. Since a general work of this kind is not intended to be exhaustive, we hesitate to mention possible lacunæ, but perhaps some reference to the recent work of Dale and Walpole on blood-clotting, and to that of Neuberg on alcoholic fermentation might have been included.

NOTES ON BOOKS

Human Infection Carriers, by Charles E. Simon, B.A., M.D. (Lea and Febiger, 1919, \$2.25). In this well-printed and attractive volume Dr Simon gives an admirable account of our present state of knowledge of the carrier problem. Even those who are familiar with the well-known book of Ledingham and Arkwright, to which we find no allusion in these pages, will discover much that is new and interesting. Among the diseases discussed by Dr Simon are poliomyelitis and pneumonia, and as regards these infections and their dissemination by carriers he has made an excellent summary of recent observations and research. A chapter is also devoted to the subject of streptococcal infections, and the influenza bacillus also comes under review. In every case bacteriological methods for the discovery of carriers and modes of treatment of chronic carriers are given, and each chapter is provided with a bibliography. An interesting appendix gives the laws relating to carriers in the different States of the Union. The book is to be recommended to all interested in public health problems, as containing an astonishing amount of information very succinctly stated.

Dr E. M. Magill is to be congratulated on the success of his little book, *Notes on Galvanism and Faradism* (H. K. Lewis & Co., 1919, 6s. net), which, after being reprinted twice, has now reached a second edition. Its modest title scarcely conveys to the reader the large amount of valuable information which it contains, ranging from the simple voltaic cell to the electron theory. In a future edition Dr Magill might perhaps revise the following paragraphs: p. 28, in reference to amalgamation, it should be pointed out that previous cleaning of the zinc in an acid is essential; p. 23, bubbles can scarcely be seen making their way to the copper; p. 30, rest for a few seconds or minutes should be sufficient; p. 193, directions might be given for renewing the electrolyte by adding distilled water. We have read this book with pleasure, and can recommend it to those who desire simple, clear, and accurate information on elementary medical electricity.

The appearance of another (4th) edition of *Dental Surgery and Pathology*, by J. F. Colyer, F.R.C.S. (Longmans, Green & Co., price £1, 12s. net), after an interval of about eight years, does not call for extended notice. The strong points of the book are its sound pathology and the insistence of the author that disease must be treated, and better still, prevented, by acting in accordance with present-day knowledge of its nature and ætiology. This leads him to ask the dentist frankly whether much of the elaborate technique of the present day does not actually cause disease, and whether it does not

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frequently aggravate disease when it is already present. The medical man is rightly becoming more and more interested in septic conditions of the mouth as the primary source of serious disease elsewhere, and he will find several chapters in which this subject is thoroughly discussed, that on "Pyorrhœa Alveolaris" being particularly useful. The illustrations are numerous and good on the whole, whilst the index is a model one in its completeness. There is probably no better treatise in the English language covering the same ground, and it can be specially commended to medical men seeking sound information upon the diseases and injuries of the mouth.

A Handbook of Gynecology, by Bethel Solomons, B.A., M.D. (Univ. Dub.), F.R.C.P.I. (Baillière, Tindall & Co., London, price 10s. 6d. net), is written for students to be used in conjunction with clinical teaching in hospital, and forms a framework of the subject which can be surrounded by the signs and symptoms as seen in hospital. It contains all the essential knowledge of the subject expressed almost too concisely, and is too limited to be really useful to the general practitioner. The chapter on the examination of the patient is applicable to hospital work only and quite impracticable in private practice.

There is a good chapter devoted to instruments and their use which should be helpful to students, and the operations, which are grouped together in the last chapter, are clearly described. The illustrations are numerous and particularly good.

As indicated in the Preface, Dr Rowland Godfrey Freeman's *Elements of Pediatrics for Medical Students* (The Macmillan Company, price 10s. 6d.) is intended to contain that information which should be thoroughly assimilated by the medical student, prior to commencing his special study of pediatrics. Development is fully described: anatomy and physiology of the newborn are the subjects of special chapters.

The care of an infant from the moment of birth onwards is well given, and there is much useful information contained in the chapter on Nursery Hygiene. Infant feeding largely follows accepted practice.

There is a chapter on Urinary Analysis, and one on Examination of the Fæces. The remainder of the book, which is extremely curtailed, deals with Physical Examination, Examination by Röntgen Ray, Diagnosis, and Treatment. Much of importance has necessarily been omitted, and what is included cannot be of much practical help, because of its sketchiness and lack of cohesion. It would have been more appropriate if the contents had been limited to the problem of keeping infants and children well by proper *régime* and feedings, and the subject of the sick child left untouched.

Auto-erotic Phenomena in Adolescence, by K. Menzies (H. K. Lewis & Co., London, price 4s. 6d. net). The idea that masturba-

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tion practised in moderation is not injurious physically but may be psychically is not a new one; but that our modern knowledge on the subject rests on such a view, and that we are indebted for it to psycho-analysis, are the main excuses which Mr Menzies puts forward for writing this book. Having claimed so much, one of the witnesses he puts forward on his own side is Sir James Paget!

The treatment advocated is the common-sense one of impressing on the patient that while the condition is not harmful to his body, it is desirable that he should expend his energies on something more elevating and useful. No exception can be taken to this, but it may be pointed out that the first part cannot possibly be arrived at by psycho-analysis, but must be the dictum of the physician.

Although the title of the book is as above, masturbation is the only auto-erotic phenomenon described, another instance of that attitude which makes psycho-analysts first say "sex," then say they mean something very wide, then talk about nothing but sex in the narrowest sense.

The chief interest of the book is that it exemplifies how far the practice of Freudism differs from its theory. If psycho-analysis is worth doing in cases of masturbation, its object should be to find out why a given individual masturbates.

Anæsthesia and the Nurse's Duties (Wm. Heinemann, 3s. net) is a reprint of lectures given to nurses by the late Dr de Prendeville. The author suggests that the best nurses in their final year of training should be taught the practical administration of anæsthetics, claiming that the nurse might often be of great help as an anæsthetist to a medical practitioner in remote districts. Unfortunately, as a literary effort, the book leaves much to be desired.

The ever increasing bulk of the standard surgical text-books consequent upon the rapid expansion within recent years of the subject of surgery has apparently led to a demand on the part of the student for manuals in which the information necessary for examination purposes is condensed and epitomised. This demand is being met by the publishers, as the volumes on our table testify. Whether the student is well advised to rely upon memorising such epitomies rather than on studying one of the larger text-books is a question we need not stop to discuss. Much depends upon the skill with which the "potting" process has been accomplished and the sense of perspective that has been maintained.

Mr W. Q. Wood has succeeded in these respects better than most, and his *Text-book of Surgery* (James Galloway, price 15s.) should prove useful to the student in revising the subject before an examination. The author has followed the conventional arrangement of the sections, which will make the book a convenient supplement to notes taken in a systematic course of surgery.

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Mr Arthur Cooke's small work, *Groundwork of Surgery* (W. Heffer & Sons, Ltd., price 7s. 6d.), is even more limited in its scope. It is "for first-year students" and is intended to give them a proper perspective of the work in view, before passing on to a systematic text-book. We do not profess to have got the perspective even of the "groundwork" itself, and we cannot find a place for such a book in a sound system of teaching clinical surgery. One feature, however, we can commend—the footnotes giving the derivations of technical words.

Dr Archibald L. Macdonald's *Essentials of Surgery* (J. B. Lippincott Co., price 8s. 6d.) is a well-illustrated summary of surgery, specially addressed to senior nurses.

We have received new editions of two perennial works on minor surgery—Mr Gwynne Williams' version of Heath's *Minor Surgery and Bandaging* (J. and A. Churchill, price 10s. 6d.) and Pye's *Elementary Bandaging and Surgical Dressing* (John Wright & Sons, Ltd., price 3s. 6d.). It is enough to say that the former is in its seventeenth edition and the latter in its fourteenth.

The second edition of *A Text-book of Surgery for Dental Students*, by Percival Mills and Humphrey Humphreys (Edward Arnold, 1919, price 14s. net) does not show any fundamental changes from the original one of 1913. Certain sections, however, dealing with subjects in which recent advances have been made, have been brought up to date. We consider it one of the best manuals of its kind.

Fully one-half of Dr Victor Cox Pedersen's *Text-book of Urology* (Henry Kimpton, 1919) is given over to a description of acute urethritis, its immediate and more remote complications, the indications of these and their treatment. In the middle of the book Dr Pedersen introduces two chapters, one on the general principles of diagnosis, and the other on the general principles of treatment. This departure is a successful innovation, enabling the reader to obtain a broader outlook on the principles underlying the more recent methods of diagnosis and treatment, and a practical detailed description of how these can best be carried out.

The concluding portion of the book deals with that portion of urology that especially falls under the care of the general surgeon in this country, dealing as it does with the technique of posterior urethroscopy, cystoscopy and such associated diagnostic aids as pyelography.

The indications and diagnosis of such conditions as prostatic enlargement, acute renal infections, neoplasms of the kidney are dealt with, but no attempt is made to produce a complete treatise on these subjects. The author has wisely limited the scope of his work to dealing with the more recent technical aids for diagnosing and treating these conditions. This text-book will prove of value to the urological specialist and to the general surgeon.

Books Received

BOOKS RECEIVED

AITCHISON, R. S. A Medical Handbook. Fifth Edition (Charles Griffin & Co., Ltd.)	10s. 6d.
BALLANCE, Sir Charles A., assisted by Charles David Green. Essays on the Surgery of the Temporal Bone. 2 vols. (Macmillan & Co.)	105s.
BARLING SEYMOUR and MORRISON, JOHN T. A Manual of War Surgery (Henry Frowde & Hodder & Stoughton)	21s.
BERKELEY COMYNS and BONNEY, VICTOR. A Text-book of Gynæcological Surgery. Second Edition enlarged (Cassell & Co., Ltd.)	42s.
CARLESS, ALBERT. Manual of Surgery. Tenth Edition (Bailliere, Tindall & Cox)	30s.
CHURCH, ARCHIBALD, and PETERSON, FREDERICK. Nervous and Mental Diseases. Ninth Edition (Saunders Company, Ltd.)	30s.
FINDLAY, LEONARD. Syphilis in Childhood (Henry Frowde & Hodder & Stoughton)	8s. 6d.
GROVES, E. W. HEY. Surgical Operations: A Text-book for Nurses (Henry Frowde & Hodder & Stoughton)	21s.
HALLIBURTON, W. D. Physiology and National Needs (Constable & Co., Ltd.)	8s. 6d.
HAM, R. BURNETT. (Edited by H. R. KENWOOD.) Handbook of Sanitary Law. Eighth Edition (Henry Kimpton)	5s.
HAZEN, HENRY H. Syphilis (Henry Kimpton)	36s.
JACK, WILLIAM R. Wheeler's Handbook of Medicine. Sixth Edition (E. & S. Livingston)	12s.
JONES, FREDERICK WOOD. The Principles of Anatomy as seen in the Hand (J. & A. Churchill)	15s.
KNOX, ROBERT. Radiography in the Examination of the Liver, Gall Bladder, and Bile Ducts (Wm. Heinemann (Medical Books), Ltd.)	7s. 6d.
LAURENS, GEORGES. Translated by H. Clayton Fox. Oto-Rhino-Laryngology. Second Edition (John Wright & Sons, Ltd.)	17s. 6d.
LOWRY, EDITH B. The Woman of Forty (Forbes & Co.)	\$1.25
MILLS, G. PERCIVAL. Practical Hints on Minor Operations (Cornish Brothers, Ltd.)	5s.
MOSES, O. ST JOHN. Manual of Obstetrics (J. & A. Churchill)	21s.
MYERS, J. E., and J. B. FIRTH. Elementary Practical Chemistry. Second Edition (Charles Griffin & Co., Ltd.)	4s. 6d.
OLDFIELD CARLTON, revised and enlarged by. Herman's Difficult Labour. Sixth Edition (Cassell & Co., Ltd.)	16s.
OVERTON, FRANK, and WILLARD J. DENNO. The Health Officer (W. B. Saunders Company, Ltd.)	20s.
READ, C. STANFORD. Military Psychiatry in Peace and War (H. K. Lewis & Co., Ltd.)	10s. 6d.
REPORT ON SCIENTIFIC WORK OF WOMAN'S HOSPITAL. State of New York, II., 1919	—
ROBINSON, ARTHUR, revised and edited by. Cunningham's Manual of Practical Anatomy, Vol. I. Seventh Edition (Henry Frowde & Hodder & Stoughton)	12s. 6d.
SAVAGE, WILLIAM G. Food Poisoning and Food Infections (Cambridge University Press)	15s.
SEARLE, ALFRED B. Colloids in Health and Disease (Constable & Co., Ltd.)	8s.
TRANSACTIONS OF THE AMERICAN OTOLOGICAL SOCIETY. Vol. XV., Part I., 1919	—
TRANSACTIONS OF THE AMERICAN PEDIATRIC SOCIETY. Vol. 30, 1918	—
WALMSLEY, THOMAS. A Manual of Practical Anatomy: The Upper and Lower Limbs (Longmans, Green & Co.)	9s.
WALTON, J. LINCOLN. Oscar Montague—Paranoic (J. B. Lippincott Co.)	6s.
WARTHIN, ALDRED SCOTT, and CARL VERNON WELLER. The Medical Aspects of Mustard-Gas Poisoning (Henry Kimpton)	42s.

Edinburgh Medical Journal

April 1920

EDITORIAL NOTES

WHEN members of the Medical Services were beginning to be demobilised on the conclusion of the Armistice, the Committee responsible for the Post-Graduate Teaching in Edinburgh. Courses in Medicine in connection with the University and Royal Colleges organised a series of practical courses in General Medicine, Surgery, and Obstetrics and Gynecology, with the object of affording graduates who had been serving with the Navy and Army an opportunity of revising their clinical work before entering upon or resuming civil practice. These courses were held both in term and during the long vacation, and were largely taken advantage of, particularly by young graduates who had passed to the services immediately after graduation. A considerable number of members of various Colonial medical services as well as of the American Medical Corps also attended the courses before leaving this country.

Now that the need for this particular form of post-graduate instruction has passed, the Committee have made arrangements to revert to the more advanced teaching which they carried on before the war. The programme that has been arranged differs in some respects from that followed in the pre-war courses. It is proposed, for instance, to carry on certain classes during the summer and autumn terms, and others during the vacation, instead of concentrating all the post-graduate teaching in the vacation months of August and September. A greater variety of courses is provided, each course being conducted by a team of teachers co-ordinated by a director. The syllabus has been so arranged that a student may devote all his time to one specialty, or he may attend two or more correlated classes if he desires to do so.

The syllabus for 1920 provides for courses in Clinical Therapeutics, Tuberculosis, Diseases of the Blood, Diseases of the Renal System, Diseases of the Alimentary System, Diseases of the Circulatory System, Diseases of the Ductless Glands, Advanced Bacteriology, Serology,

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Advanced Medical Anatomy, Advanced Surgical Anatomy, Abdominal Surgery, Genito-Urinary Surgery, Surgery of Children, Diseases of the Larynx, Ear, and Nose, Ophthalmoscopy and Errors of Refraction, Clinical Gynecology and Clinical Obstetrics, Venereal Diseases, and Child Welfare.

It is hoped that arrangements will soon be completed under which a physician or a surgeon will conduct a clinique for graduates each forenoon throughout the year. This will ensure that graduates who visit the Royal Infirmary will have an opportunity of attending a ward visit or clinique conducted on more advanced lines than the ordinary undergraduate teaching.

The detailed syllabus may be obtained on application to the Hon. Secretary, Post-Graduate Courses in Medicine, University New Buildings, Edinburgh.

At an Extraordinary Meeting of the Royal College of Surgeons of Edinburgh, held on 3rd March, with the President, **Royal College of Surgeons of Edinburgh.** Dr George Mackay, in the Chair, it was resolved to admit women to the Fellowship of the College after examination, on the same conditions and with the same privileges as men.

Mr Susie Kumar Mukhopadhaya, L.M.S., Calcutta, has been granted the Diploma of Licentiate of the Royal College of Surgeons, after examination.

At the recent Dental Examinations twenty-one candidates passed the first professional examination, and forty-six passed in the subjects of Chemistry and Physics.

The following candidates passed the Final Examination and were granted the diploma L.D.S., R.C.S., Edin. :—Ernest Joseph Millhouse, South Australia; Frederick Duncan Stephenson, Edinburgh; Robert Haddow Mitchell, Edinburgh; Frederick James Duncan Cass, Edinburgh; Henry Augustus Taylor, Leith; George Thomson Paterson, Portobello; Alfred Charles Trotter, Simla, India; Arthur Brown, South Shields; and Joseph Nixon, Whitehaven.

SCURVY IN NORTH RUSSIA.*

By JOHN D. COMRIE, M.A., B.Sc., M.D., F.R.C.P., Lecturer on History of Medicine and on Clinical Medicine, University of Edinburgh ; lately Consulting Physician North Russian Forces.

Historical.—Scurvy is a disease which has existed from early times. The first clear account of it is given by the Sire de Joinville, Seneschal of Louis IX., during the disastrous Crusade in the year 1249. He says, "We were attacked by the Army sickness, which was such that our legs shrivelled up and became covered with black spots, and spots of the colour of earth like an old boot ; and in such of us as fell sick the gums became putrid with sores and no man recovered of that sickness, but all had to die. It was a sure sign of death when the nose began to bleed. . . . The sickness became much more severe throughout the camp, and the proud flesh in our men's mouths grew to such excess that the barber-surgeons were obliged to cut it off, to give them a chance of chewing their food or swallowing anything." As a result of the general weakness caused by scurvy throughout the army, the Saracens invaded the camp, killed great numbers of the Crusaders, and captured King Louis and his knights.¹

In the sixteenth and seventeenth centuries scurvy was endemic in various parts of Europe, and in the eighteenth century it produced an enormous number of deaths among sailors serving in the Seven Years War and elsewhere. For example, in the voyage of Lord Anson round the world in 1740-44, after the ships had been at sea from 18th September 1740 to 7th March 1741, scurvy broke out with great severity among the crews. The most common symptoms were, in the words of the Rev. R. Walter, who edited Anson's papers : "Large discoloured spots, dispersed over the whole surface of the body, swelled legs, putrid gums, and, above all, an extraordinary lassitude of the whole body, especially after any exercise, however inconsiderable ; and this lassitude at last degenerates into a proneness to swoon, and even die, on the least exertion of strength, or even on the least motion." He adds that "alacrity of mind and sanguine thoughts were no contemptible preservatives from its fatal malignity." Further symptoms were "putrid fevers, pleurisies, the jaundice, and violent rheumatic pains, and

* Communicated to the Medico-Chirurgical Society of Edinburgh, 21st January 1920.

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sometimes it occasioned an obstinate costiveness, which was generally attended with a difficulty of breathing; and this was esteemed the most deadly of all the scorbutic symptoms. At other times the whole body, but more especially the legs, were subject to ulcers of the worst kind, attended with rotten bones and such a luxuriance of fungus flesh as yielded to no remedy." In one month (April 1741) no less than 43 men were buried from H.M.S. *Centurion*, and when Juan Fernandez was reached early in June, over half the crew had perished, and the remaining 210 men were so weak that the ship could hardly be brought to anchor. Finally, 12 or 14 men died as they were being landed in the boats, but the remainder speedily recovered on the diet of vegetables, fresh fish, and goats' flesh, which the island provided.²

With regard to treatment, the use of fresh vegetables has long been known. Wirtzung, in the end of the sixteenth century, recommends fresh watercress, or horse-radish, or scurvy-grass (*cochlearia*) pounded up in wine or beer; fresh fruit and vegetables had been successfully used by the Dutch since 1564, and by Sir R. Hawkins in the *Dainty* in 1593; and John Woodhall, in *The Surgeon's Mate* (1636), mentions the virtues of lemon juice for scorbutics. James Lind, an Edinburgh graduate, and later Physician to Haslar Hospital, reintroduced the use of fresh vegetables and fruit, especially oranges and lemons, about 1754. As Lind, unfortunately, advocated the use at sea of *preserved* orange and lemon juice, which failed in the hands of the famous Captain Cook on his voyage to the southern hemisphere in 1773-74, this again went out of favour.³ Sir Gilbert Blane, as head of the Navy Medical Board in 1795, made *fresh* lemon juice an essential part of the naval dietary, with the result that within a few years scurvy virtually disappeared from the Navy.⁴ The curative properties of potatoes among civil prisoners suffering from scurvy were pointed out by Dr Baly about the middle of the nineteenth century. The preventive action of vegetables has been variously attributed to potash salts, to vegetable acids, and to their green colouring matter, but the essential factor seems to be some vital principle, since the same vegetable or fruit juice which is useful in a fresh state becomes inert after prolonged boiling or desiccation.

In North Russia at the present day scurvy is endemic every winter, and I propose to give my experience of some 600 cases of this disease which I saw while I was Consulting Physician to

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the Forces in that country during 1919. I saw a large number of cases under treatment in the Russian civil hospitals both at Murmansk and Archangel, and at the former place I was told by Dr Rabin, Port Medical Officer, that the favourite treatment is by the addition of two pints of fresh milk to the ordinary daily diet. The experiments of Chick, Hume, and Skelton, however, would seem to show that fresh milk is a food poor in the anti-scorbutic accessory factor.⁵

Among the British troops, scurvy of any severity was practically negligible. Four cases only were admitted to hospital and diagnosed, one in March, the other three in May 1919. It is probable, however, that the cases of debility with depression and discontent, which were found in considerable numbers at the end of the long winter, were due in part to a mild manifestation of this disease as well as to over-indulgence in alcohol. The rarity of scurvy among the Allied troops is largely to be explained by the inclusion in their dietary, from January 1919 onwards, of germinated peas and beans prepared as recommended by Dr Harriette Chick and Miss E. M. Hume.⁶

Causation.—In the Russian prisons at Archangel, scurvy appeared on a large scale in February 1919. Arrangements were made for admission of these scurvy cases to a special hospital established on Kegostroff Island in the spring. I am indebted to the admirable report of Captain A. J. Stevenson, R.A.M.C., the officer in charge of the hospital from June onwards, for details as to the relative incidence of various symptoms in 200 cases of which he made detailed histories.

The prison daily dietary had been since January 1918 till May 1919 as follows:—

Flour or biscuit	11 oz.
Rice, oatmeal, peas or beans	7 $\frac{1}{4}$ "
Frozen or tinned meat, or salt-herring	7 $\frac{1}{4}$ "
Bacon or pork	1 $\frac{3}{4}$ "
Tea	$\frac{1}{4}$ "
Sugar	1 "
Salt	$\frac{3}{4}$ "
Lime Juice (preserved)	$\frac{1}{2}$ "

All the prisoners admitted to hospital complained of not having had sufficient to eat in prison. The amount, especially as regards carbohydrates, appears to be too low when one takes into account the excessive cold of the northern winter. The entire absence

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of fresh food is noticeable, and the preserved lime-juice is apparently of little use save as an alkali. Further, all the meat and vegetables were boiled for about three hours. As a result, scurvy appeared in the prisons with great severity during February and March 1919, and new cases developed throughout the spring. It was found that the average period during which a man had been subjected to the above defective diet before he began to show signs of scurvy was 4.7 months. No doubt, the lack of exercise, the crowded prison, the depression engendered by bad surroundings, and the darkness of the long Arctic winter nights all contributed to this result. It may be noted that in Anson's expedition of the eighteenth century, where the pre-scorbutic period can be fixed with equal definiteness, the duration of the unfavourable conditions before scurvy appeared was six months. It was observed that the concurrence of other diseases, such as typhus, typhoid, influenza, and pneumonia, shortened the pre-scorbutic period so that some prisoners who had such illnesses developed scurvy, from one to three months after entering the prison. In general, the severer forms of scurvy, showing marked swelling of the gums, large muscle, joint, or subperiosteal hæmorrhages and great debility, were seen in the younger men, and these amounted to about 27 per cent. of the cases. (Fig 1.)

Symptoms.—The first sign was very commonly a purpuric rash on the legs, and with this the patient complained of weakness, loss of energy, and depression of spirits. Swollen and bleeding gums, swelling of the ankles, and pains in various parts such as the head, the chest, or the legs, were also early symptoms.

Over 80 per cent. developed sooner or later swelling of the gums, which were tender, bled easily, and often ulcerated. Very frequently large, soft, tender, tumour-like swellings developed on the palatal aspect of the upper alveolar margin, and filled up the palatal arch so as to make chewing very difficult (Fig. 3). In about half the cases there was a condition of severe gingivitis or even pyorrhœa, the teeth being loose and surrounded by pockets of pus; but this condition passed off as the general symptoms abated.

About 86 per cent. showed well-marked hæmorrhages, and these were usually on places subjected to pressure like the trochanter, elbow, shoulder, just above the popliteal space, or on sites where a blow had been received. Deep hæmorrhages



FIG. 1.

Large subcutaneous and muscle hæmorrhage
right thigh and leg.



FIG. 2.

Small cutaneous hæmorrhages ; and contracture
following hæmorrhage into right knee.

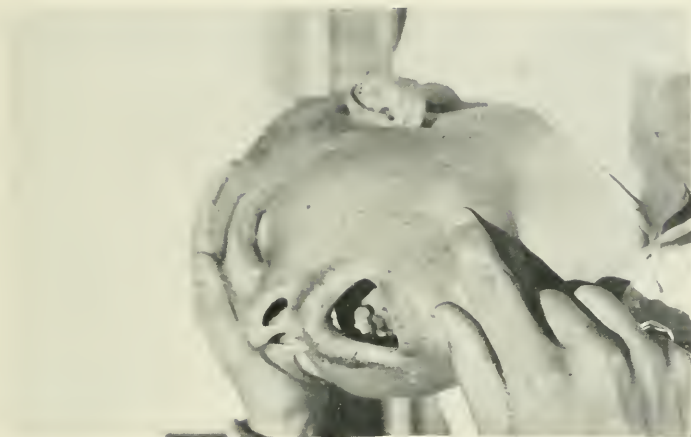


FIG. 3.

Scurvy gums with tumour-like palatal
swellings.

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in the muscles were found in over 50 per cent. of cases, usually in the legs, and they were accompanied by pain, tenderness on pressure, gave a feeling of woody hardness to the hand, and caused limitation in the movements of the limb concerned. Hæmorrhages into joints were somewhat difficult to distinguish with certainty from effusions of blood in the muscles and areolar tissues near the joint, but the actual joint (most commonly the knee) seemed to be affected in at least 10 per cent. of cases. Swelling of the joint, restricted movement, and tenderness when any attempt was made to move the affected limb were found, and this sign was the most persistent result of scurvy, the affected limb remaining stiff and contracted long after all blood had been absorbed and all other symptoms of scurvy had disappeared (Fig. 2). These joint affections were especially noted in the Russian civil hospitals. Subperiosteal hæmorrhages on the exposed parts of the ulna and tibia and on the back of the hand were noted in a few cases. When recovery was progressing, the muscle hæmorrhages were absorbed with striking rapidity, large black and hardened areas of 4 to 5 inches diameter resolving completely in two or three weeks. Hæmorrhages also occur in internal organs, and traces of partly absorbed blood were found on post-mortem examination beneath the parietal peritoneum, inside the bowel, into the pleura, in the meninges, and in the lung. In two cases there was bleeding from the bowel, in two from the urinary passages, and one had a cerebral hæmorrhage. When the hæmorrhage infiltrated the skin over a bony prominence like the trochanter or elbow or shin, or if any wound of such a devitalised area took place, an ulcer with raised edges was apt to form and to be very slow in healing.

The heart was always feeble, and in a considerable number of cases functional murmurs were audible. In cases where a post-mortem examination was performed, the cardiac muscle showed a striking degree of brown atrophy with great reduction in size of the ventricles. This and the large effusions sometimes found in the pleural cavities constitute the great risk for severe cases of scurvy, in which sudden death is very liable to occur. The blood-vessels in sections which were examined by Captain Stevenson showed no obvious changes.

The blood naturally attracted interest. Anæmia and great muscular wasting were obvious features of the severer cases, and there was a great deal of brownish pigmentation in the

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skin of dependent parts even where there had been no large hæmorrhages. A careful microscopic examination of the blood was made by Captain Stevenson in fifty cases of average severity, and the following table shows the average figures obtained by him :—

Red Cells	4,080,000	Polymorphs	45 p.c.
White Cells	7,510	Large lymphocytes . .	20 „
Hæmoglobin	55 p.c.	Small lymphocytes . .	29 „
Colour Index	·68	Eosinophiles	4 „
		Mononuclears	2 „

The characters were therefore those of a secondary anæmia with lymphocytosis. The coagulation time (average three and a half minutes) was not appreciably altered, and no special tendency to hæmorrhage from superficial wounds was noticed. There was slight diminution of the blood alkalinity (by Van Slyke's method).

With regard to the urine there was little abnormality. Albuminuria was observed five times only. In four cases only out of fifty was the urine alkaline. Hæmaturia was noted in three cases, one of these (a British soldier) having acute nephritis as well as symptoms of scurvy. No tube casts were found in any other cases.

Diagnosis.—The well-marked case is easy to diagnose by means of the hæmorrhages, the condition of the gums, and the general weakness and deterioration of health. But it is probable that isolated cases of less severity are often missed and regarded as debility of unknown origin, anæmia, rheumatic purpura, etc. In the present outbreak of scurvy, and probably in others, some cases which were regarded as typhus fever seemed afterwards to have been a combination of scurvy with one of the typhoid group, the rash of typhus and of scurvy being at first practically indistinguishable save for the fact that the minute scurvy hæmorrhages occur mainly on the legs and persist without fading for several weeks. Cases of mental depression and unexplained cardiac weakness with œdema and effusions into the serous cavities, when associated with a history of defective diet, should lead to a careful examination of the gums for swelling and of the legs for hæmorrhages. I have frequently seen cases in Scotland, especially in patients from mining districts, with a history of defective nutrition, which appeared to be cases of minor scurvy. These are very apt

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to pass through hospital unrecognised and diagnosed as "anæmia," "debility," "purpura," unexplained "hæmorrhage," etc.

Treatment.—This falls under the three heads of (a) preventive treatment; (b) curative treatment; and (c) treatment of symptoms.

(a) *Preventive.*—Want of exercise, low temperature, depressing circumstances, and the occurrence of infectious diseases, undoubtedly predispose to the onset of scurvy, but the determining factor appears to be certain dietetic defects. The defect is supplied by fresh fruit, fresh milk, fresh meat, potatoes, and green vegetables such as cabbage, which is specially favoured by the people of North Russia. When scurvy occurs, however, these articles are usually scarce or unobtainable, and the simplest effective method is to issue a ration of germinated peas or beans (5 to 8 ounces dry per diem). For germination the dry peas or beans are steeped in water for twenty-four to forty-eight hours, depending on the hardness, until the embryonic root begins to sprout; thereafter they are spread on a damp cloth and covered by another wet cloth for a further period of thirty-six hours or thereabout till the sprout is about half an inch long. They must then be lightly boiled with milk or water for a period not exceeding half an hour. Beans are much more difficult to soften and germinate than peas, and therefore less suitable than the latter. Lemons (4 ounces) or fresh lime-juice (1 ounce) are invaluable if obtainable, but the experience of the North Russian prisons, as well as the history of the subject, shows that lime-juice which has been preserved for several years is practically inert in preventing scurvy.

(b) *Curative.*—Among the Russians, milk, either fresh or soured by the action of the lactic acid bacilli naturally present in the atmosphere, is considered specially efficacious in treatment. The proved value of sour milk is interesting in connection with the habitual use by the Tartars of koumiss or kefir.

For purposes of comparison, forty-eight patients of about the same severity were taken at Kegostroff Hospital, divided into six groups of eight, lettered A, B, C, D, E and F, which were segregated from one another, and a different vitamine-containing food was added to the general diet of each group. The patients being under guard as prisoners, it was easy to ensure that the feeding conditions were faithfully adhered to during the six weeks over which the test lasted. The general diet consisted of bread, 12 ounces; oatmeal, 2 ounces; fat, 1 ounce;

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frozen meat, 10 ounces, boiled for three hours; milk, 2 pints, boiled for one and a half hours; and ungerminated peas or beans, 8 ounces, boiled for three hours. For the purpose of the test each group of eight had this diet varied in a different particular. Thus to the diet of group A was added the juice squeezed from 4 ounces of fresh lemon; group B received 8 ounces of germinated peas, lightly boiled, instead of the same quantity of ungerminated peas; group C received 8 ounces of germinated instead of ungerminated beans; group D received 10 ounces of fresh underdone meat instead of well-boiled frozen meat; group E had an addition of 8 ounces tinned fruit; and for group F, 2 pints of unboiled soured milk replaced the well-boiled milk of the other groups.

After six weeks, improvement had occurred in all six groups. The improvement was judged both by general well-being and more precisely by the increase that had occurred in body-weight. Group F (soured milk) showed most marked improvement, having added over 14 per cent. to the original body-weight; groups D (fresh meat) and A (lemon juice) came next with an addition of between 10 and 11 per cent. each; group B (germinated peas) put on over 7 per cent.; and groups E (tinned fruit) and C (germinated beans) had an accession of between 6 and 7 per cent. each. The germinated beans had a tendency to cause diarrhoea probably by their hardness and indigestibility; hence, no doubt, their lowness in the scale.

(c) *Treatment of Symptoms*.—Mouth-washes of alum or of hydrogen peroxide were given to cleanse the mouth, and the gums were painted with salicylate of soda dissolved in alcohol or with tincture of iodine. For the absorption of the hæmorrhages in the early stages, painting with tincture of iodine, and later massage combined with hot water or vapour baths, were used. The contractures of the limbs often required prolonged treatment by massage and oil inunction. Tonics of iron, arsenic, and strychnine were necessary to improve the appetite and the general health. Ulcers were treated by mild antiseptic dressings.

Summary.—Scurvy is endemic in North Russia, and breaks out every year towards the end of the winter among the poorer classes of the population.

While various factors predispose to its occurrence, the determining condition is a vitamine-deficient diet taken over a period of four to six months. The onset is hastened by intercurrent infectious disease and other devitalising influences.

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If fresh meat and fresh vegetables be scarce, the simplest anti-scorbutic diet consists of germinated peas and beans, lightly cooked. Lime-juice which had been preserved and kept a long time was found to have little, if any, value in the prevention of scurvy.

Among the additions to the diet of prisoners suffering from scurvy, which were found to be of greatest curative efficacy, came in order of value—soured milk, fresh meat, fresh lemon juice, germinated peas, tinned fruit, and germinated beans.

Cases of scurvy recover with great rapidity in favourable circumstances and with proper diet; almost every case loses all symptoms within one month, except as regards the contractures produced by the hæmorrhages, which may require prolonged treatment.

The chief danger is from sudden failure of the heart, which undergoes brown atrophy in the general wasting and may be embarrassed by excessive pleural effusions.

REFERENCES.—¹ *St Louis, King of France*, by the Sire de Joinville, trans. by James Hutton, Cambridge, 1910. ² *A Voyage Round the World*, by George Anson, Esq., compiled by Richard Walter, M.A., Edinburgh, 1776. ³ Rolleston in *Journal of the Royal Naval Medical Service*, 1915, p. 181. ⁴ *Ibid.*, 1916, p. 72. ⁵ *Biochemical Journal*, vol. xii., June 1918, p. 131. ⁶ *Medical Research Committee's Report*, No. 38.

SUGGESTIONS AS TO THE CAUSES OF THE PERSISTENCE OF PUERPERAL SEPTICÆMIA SINCE THE END OF PRE-ANTISEPTIC TIMES.*

By D. BERRY HART, M.D., F.R.C.P.E.,
Lecturer on Midwifery and Gynæcology, Surgeon's Hall, Edinburgh

INTRODUCTORY.

ABOUT seventy years ago Semmelweiss introduced into midwifery the use of antiseptics for the "unclean touch," and reduced the dreadful puerperal mortality in the First Obstetric Clinique of the Vienna General Lying-in Hospital (then under Klein's charge) to what then seemed reasonable limits. Under von Boër, Klein's predecessor, who was imbued with English ideas of cleanliness, it had stood at 0·84 per cent. in 1822. The special point to be considered is that now and for some time the mortality has not fallen in Great Britain and Ireland much below pre-antiseptic times as far back as 1822. Bonney has investigated the statistics and concluded as follows, quoting Newsholme's figures:—

Death-rates from Puerperal Sepsis (per 1000).

Years.	England.	Wales (including Monmouth).	Scotland.	Ireland.
1881 to 1890	2·56	3·11	2·42	2·83
1911 to 1914	1·39	1·67	1·44	2·01

Newsholme also puts it thus—

Deaths per 1000 from Puerperal Sepsis.

<i>In England</i>	the present average is	{ 1 maternal death for every 250 registered births.
<i>In Ireland</i>	„ „	{ 1 maternal death for every 191 registered births.
<i>In Wales</i>	„ „	{ 1 maternal death for every 179 registered births.
<i>In Scotland</i>	„ „	{ 1 maternal death for every 175 registered births.

This, compared with von Boër's 0·84 per cent., is not a remarkable fall considering all the modern advances in treat-

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ment, and summed up year after year means many deaths and much consequent disaster in families.

In Scotland in 1915 there were 114,181 births, with 698 maternal deaths attaching to childbirth, making a proportion of 6.1 per 1000 live births. Of the 698, 262 were from sepsis. and of all deaths 37 per cent. were from the same cause.

Are we to consider our present puerperal septic rates in ordinary labours as an irreducible minimum? Should we not carefully scan our present methods to find out if there is any flaw in our technique?

In the debate on Bonney's paper, Champneys, however, stated that the Midwives Act had brought about "a sudden and considerable fall"; "this rate prior to 1903 was never below 4.41 per 1000 births: in 1911 it was 3.67" (p. 98, in debate on Bonney's paper, *R. S. Medicine Proc.*, xii, No. 8).

There is therefore a residuum of causes yet to be investigated, and the consideration of this residuum is the object of the present article.

HISTORICAL.

A general view under this head is alone possible. In 1822 von Boër had a mortality of a fraction of 1 per cent. in the Vienna First Obstetric Clinique. When he was succeeded by Klein, an obstetric mandarin of the most appalling type, the First Clinique at once became infamous from its high mortality (7.8 per cent.). This was viewed with absolute apathy by him and no steps taken to understand or diminish it. Fortunately Semmelweiss appeared as Klein's assistant and threw himself heart and soul into the question of the causes of the high morbidity and mortality. The whole story of his work need not be narrated, as it has already been recorded in the graphic pages of Sinclair, Duka, and Fritsch, especially fully by the first named. What Semmelweiss finally settled was that the students who came directly from the post-mortem rooms, where they had been handling specimens, carried on their non-disinfected hands what Semmelweiss termed "cadaveric poison," giving practically an extrinsic septic source of infection. In the Midwives' Clinique the mortality was 3 per cent. One cannot go further into Semmelweiss's tragic career, but he now stands as one of the most heroic figures in all time. Semmelweiss's doctrine spread slowly, and it was even strongly opposed. Bacteri-

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ologists have shown that "cadaveric poison" is really in its essence micro-organismal (Pasteur identified a streptococcus as causal), and the discovery of toxins and antitoxins gave greater precision to our knowledge, although the practical effect of the latter has not been great, and is not to be compared with that of antidiphtheritic serum.

The greatest advance came from Listerism, but the obstetrician did not quite know how to apply it. He imitated the hand cleansing with carbolic and the cleansing of the skin area involved in labour, but was unable to utilise the spray and gauze dressings. Carbolic vaginal injections were greatly used at one time, but ultimately given up as risking deeper infection from the imperfectly cleansed external parts. It was gravely proposed by one obstetrician to receive the babe in a nebulous carbolic mist!

The question of the best antiseptic for disinfection came up, and Koch did splendid service in giving the criteria for a trustworthy antiseptic. It was long debated whether the examining hand could really be rendered sterile, but the introduction of boiled rubber gloves has been a great advance, as well as the boiling in soda solution of all instruments used.

All such precautions are absolutely necessary, but the question of the best antiseptics, how to have a clean environment, how the attendant is to avoid infecting his patient during his attendance on her during labour are still *sub lite*, and on this Bonney's remarks are excellent and I need not discuss these points at present. The whole question is surrounded with difficulties, especially among the poor and the working classes. It may be settled for them by State Maternity Hospitals, but not probably in our day. The gist of all this is that we have still a residual septic mortality which runs round about 1 per cent., and in time totals up to a loss of thousands of mothers, the crippling of only too many who recover, the loss of infants and the domestic suffering to the family, which is great and cannot be reckoned in figures.

ANALYSIS OF THE FACTORS IN PUERPERAL SEPTICÆMIA.

These are—

1. Imperfect antisepsis and asepsis, local and general.
 2. Defects in labour technique on the part of the obstetrician.
- I do not discuss the first, but take up specially the second.

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DEFECTS IN LABOUR TECHNIQUE ON THE PART OF THE OBSTETRICIAN.

The sites of infection are *in the uterine cavity above the retraction ring; in the lower uterine segment and cervical canal; in the developed pelvic floor at its lower end.* The first is the most important, and depends chiefly on the management of the third stage or on internal manipulation; the second is associated with infection due to laceration of the cervix and the digital and other treatment for the arrest of bleeding. Taking the sequence of labour causally considered, the first to be taken up is lacerations of the cervix and the rarer ones of the lower uterine segment. These, unfortunately, we cannot completely prevent, and they are often present after forceps and turning cases if due time is not given to attain complete dilatation. If the cervix is infected by digital unclean pressure to arrest hæmorrhage, the most likely thing to occur is septic cellulitis.

The *upper part of the vagina* is not often lacerated and transverse tear is rare, but I have seen the right lateral junction of the vaginal walls torn up into the broad ligament in a too early application of long forceps. Freund was quite right in speaking of the forceps as a most terribly bloody instrument when used too early. What we may term the *perineo-vaginal tract* is, however, the most frequent site of tear in labour, and we must now consider how this happens and how best it may be prevented.

Nægele in his great contribution to the mechanism of labour, gave a clinical and most admirable contribution to the subject, one that has formed the basis of all descriptions. Round his work has crystallised all our knowledge in the four classical movements of flexion, internal rotation, extension, and external rotation. The after-descriptions of levelling by Hodge and Kùneke have been shown to be erroneous, or at least not ascertainable, by Matthews Duncan, and are now abandoned.

We must remember that Nægele worked under difficulties due to the state of knowledge then, to the fact that at one time he did not recognise the obliquity of the plane of the brim to the horizon, and to a too strict adherence, almost necessary, to the posterior and usually deeper fontanelle as his guide to head movements. I may note here that normally the head

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does not present *at* the brim, but lies well into the upper strait of the pelvis, especially in primiparæ. It was, however, in regard to the movement of flexion that Nægele's mechanism was deficient, and almost all after-observers followed him in this. It may be said at once that the movement of increase of flexion does not occur soon after labour starts; therefore attempts to explain increase of flexion are explanations giving causes for a movement that does not happen.

What clears it up is the frozen sectional anatomy of pregnancy and labour, and the casts of fœtuses at the various stages of labour, due to the work of Braune, Barbour, Chiara, Chiari, Zweifel and many others too numerous to mention,* and our knowledge may be summed up as follows:—

AT THE END OF PREGNANCY.

Here we have the well-known attitude—chin on sternum, the arms across the chest, etc. The clinical deduction from this was that when labour started the fœtus became more compacted and flexed, the chin pressed more against the sternum, and it was assumed that the fundus gradually sank as labour progressed (W. S. Playfair in his text-book of Midwifery; see his *Midwifery*, eighth edition, p. 338). This is a good example of how *a priori* reasoning and lack of direct observation can mislead us. Schroeder and Stratz stated that the fundus did not sink, and also that towards the end of labour *liquor amnii* lay between breech and fundus. I pointed out that this was not shown in Braune's section of the case at the end of the first stage. Barbour's section, however, showed that when the labour was at a more advanced stage *liquor amnii* did lie as Schroeder and Stratz had stated from clinical observation.

Their measurements of labour cases between fundus and symphysis top showed an unvarying 24 cm., while between fundus and the advancing head the measurements gradually increased (up to 31 cm.).

Braune's section shows that the fœtus becomes elongated during labour, the anterior surface of the fœtal abdomen is exposed to view, the arms have come to lie between the fœtal chin and chest, the legs have passed up, but as yet *liquor*

* We have practically all stages of labour and its complications shown in section except face presentation.



SCHROEDER AND STRATZ'S SECTION WITH FÆTUS REMOVED

Note early separation of membranes from expanding lower uterine segment in early first stage and placenta still attached.

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ammii does not lie between fundus and breech. Most remarkable of all, the head is deflexed (extended), and this keeps on until, as in Barbour's foetal cast, the head is markedly deflexed and remains so, or becomes increased as the head is "crowning." Of course Barbour's section is the most advanced in the second stage of labour, but lateral skiagrams might give further information.

The foetus is expelled therefore in the following manner:—

1. The lower uterine segment becomes canalised and expanded practically to a cylinder 10 cm. \times 10 cm. At the end of pregnancy the lower uterine segment lies in the upper strait of the bony pelvis and is a hemispheroid, but by the end of the first stage the circular vein in front is normally about 2 to 3 inches above the symphysis, while the section of the same vein is at the level of the promontory (Braune, Barbour). The fundus has not sunk and the foetus is elongated, compressed, with the head deflexed. The legs of the foetus have passed up, while the arms now lie in front of the anterior surface of the neck, either the cause or result of deflexion. In one case, a leg is in front of the neck and one leg up. The head now enters more deeply into the pelvic floor, becomes more deflexed, and ultimately low down in the pelvic floor undergoes rotation in the usual manner, which need not be detailed. The special point is that the head is not flexed in the ordinary sense, but deflexed.

Duncan's statement was that the head passed the perineum as follows, viz.: "With its suboccipital region pressed against the middle of the subpubic arch, and advancing slowly, wheeling around a point somewhere about the centre of the symphysis pubis; the region of its vertex is advancing rapidly in a larger circle, wheeling around the same point and distending the perineum to its utmost" (Papers, etc., p. 83). This may be called the wheeling movement, and on this conception we have the larger anteroposterior diameters of the head stretching the perineum in the conjugate diameter, the transverse ones at the sincipital region distending it less. This mechanism probably may happen, but the whole phenomenon is one of a combined nature, different points moving differently, and clinical observation as to what really goes on is difficult. If, however, we combine clinical observation and that obtained by a study of Braune's and Barbour's sections and casts, we may describe the foetal head as advancing by a movement of simple

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translation in the line of the brim-axis without wheeling, until the occiput emerges at the pubic arch, when it is pushed out in the axis of the outlet. The head is all this time deflexed and thus passes with diameters larger than in the supposed flexed one. When the head has emerged, the posterior rotated shoulder passes first out behind, a very disadvantageous movement occasionally. The relation between the head and outlet is such that after internal rotation, the long head diameters coincide more or less accurately with the large anteroposterior pelvic diameters and the teleology of this has often been expounded.

The whole mechanism of the expulsion of the fœtus during labour is marvellous and requires skill to unravel, but the final passage of the head is in some respects disadvantageous and requires careful handling.

THE GUARDING OF THE PERINEUM AT CROWNING.

When the perineum begins to be distended the outer skin surface is remarkably elongated anteroposteriorly and also transversely, forming in that aspect an arc. It is rendered distensible by the action of the parasympathetic, which below the level of the retraction ring flushes and relaxes the tissues, a condition due to the dilatation of blood-vessels, and a consequent transudation of serum into the connective tissue.

In guarding the perineum the gloved open hand, palm and thumb, are applied so as to cover it, and between the hand and perineal surface sterilised gauze placed on the carefully cleansed area. One then applies a gentle pressure or resistance in the line of the brim-axis. The object is to guard against undue uterine action, but chloroform, if pushed, will limit this markedly. One cannot cause ordinary flexion by this manœuvre, as the presence of the arms will in most cases hinder it and deflexion will be maintained. In time, the occiput will emerge under the pubic arch and then the distention of the parts will be eased. The pressure should be graduated and in no case should the head be shoved forward as this may injure the vascular tissue below the subpubic ligament, causing serious laceration and bleeding. The projecting tissues there may be pushed up. I have seen benefit from an internal distention of the arc-like external parts with the gloved fingers, but this seldom requires to be done.

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In elderly primiparæ I have found episiotomy useful, but here again abuse is apt to happen if it is done to save time. The clipped incisions are easily sutured. Posture is useful and ranges from the straight-legged attitude in ordinary cases to the Walcher position in primiparæ. The lateral position is best in average cases, and the lithotomy one not so safe, as in the latter one cannot see what is going on, especially at the end of breech cases. The exaggerated lithotomy posture is said to enlarge the outlet bony conjugate. In this way lacerations are reduced to a minimum and thus the chance of infection minimised. When the muscles in the perineal body are intact, skin and mucous membrane injuries are not important. I do not discuss the varieties of perineal tear, as they are many.

The lacerations of the perineum, over distention of the vagina, undue stretching of the connective tissue, are all important in their bearing on prolapsus uteri. My first suggestion is this: we must recognise that "flexion" has been shown by the frozen sections and casts we now have access to, not to exist to the degree taught in the ordinary Naegele mechanism, and that deflexion of the head begins during the first stage of labour, how soon we cannot yet say, and goes on increasing even during the head-crowning.

Guarding of the perineum must therefore be carefully carried out and lacerations beyond a certain extent sutured.

I have seen a grey film (streptococcic) on septic lacerated perineal injuries, but whether primary or secondary I am unable to say.

MECHANISM OF THE THIRD STAGE OF LABOUR.

The mechanism of the third stage of labour is greatly misunderstood, and I stand almost alone in my views as to its nature. I am convinced that I am right, but would not bring up the question again if it were only of academic interest. It is, however, of the greatest practical value, as mismanagement of the third stage of labour, the logical result of the Crédé method, is responsible for retention of membranes, this retention giving a source of infection of the most serious kind in many cases. I therefore take up the question once more, so that a thorough discussion may be elicited.

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HISTORICAL.

The history of the management of the third stage of labour is of great interest, and it is remarkable that Clarke of Dublin and Harvie of London and their predecessors advocated a waiting and non-interfering *technique*: indeed, their advice does not need much modification but rather imitation at the present day. Their advice, based on clinical observation, was neglected, and traction on the cord held the field for some time. The Dublin school advocated the "grip," the Dublin grip, and also delay before expression (McClintock), for twenty minutes. Its members, however, did not at first distinguish separation and expulsion, but this advice was on the right track and exceedingly valuable and did great service. Harvie of London (1767) for instance advised as follows: "We should never in general attempt delivering the placenta until by feeling over the pubes we find the uterus in a round hard state of contraction . . . and that it (the placenta) has been detached. Should the detachment of the placenta not be effected in the usual time, it will be much facilitated by the operator applying his hand to the region of the uterus, which he may excite to the necessary contraction by gentle friction."

THE GREAT MISFORTUNE IN THE TECHNIQUE OF THE MANAGEMENT OF THE THIRD STAGE.

In 1853 a great misfortune befell the technique of the third stage of labour, as at that time Cr  d   of Leipzig recommended the forcible expulsion of the placenta as soon as possible after the child was born. Cr  d   will always be held in esteem for his prevention of ophthalmia neonatorum by the instillation of silver nitrate into the conjunctival sac immediately after birth, but the Cr  d   instructions for the third stage have worked and still continue to work serious mischief. In his clinical lectures published in 1854, he recommended the energetic manual expression of the placenta and membranes, and thus the termination of this stage in fifteen to thirty minutes; or, as elsewhere stated, "the sooner the better." Cr  d   gave the average duration of the third stage in the Leipzig clinique as four-and-a-half minutes. In 2000 cases there were 91 retentions of membranes; 52 of these had fever and 7 puerperal h  morrhage.

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Finally, in 1892, it was recommended to wait half-an-hour before resorting to expression, *i.e.*, to await separation. After 1860 this Crédé method spread like wildfire over the world. It was said to shorten the third stage, control hæmorrhage, and save the attendant's time. It really brought on uterine inertia, forced the placenta out prematurely and tore it away sometimes almost entirely from the membranes, leaving these still *in utero*, as I have seen personally in early cases of practice.

It was the retention of membranes and hæmorrhage that led to the renewal of the waiting method specially advocated by Ahlfeld, W. A. Freund, and many others.

THE REAL MECHANISM OF THE SEPARATION OF PLACENTA AND MEMBRANES DURING LABOUR.

This depends on (*a*) clinical observation; (*b*) the study of specimens obtained by Porro-operations; (*c*) the interpretation of certain sections where the uterine aspect is shown in the early first stage of labour and more advanced stages; (*d*) specimens removed by post-mortem with the placenta *in situ*, and more or less separated or even expelled.

(*a*) *Clinical Observation*.—When the child is born, the fundus if not interfered with by manual pressure, and if the woman is narcotised, remains high, but usually sinks, as the lower uterine segment is flaccid, and the intra-uterine support the child gave towards keeping the fundus high, withdrawn. The body of the uterus has its fundus after this at the level of the navel and is easily grasped. After a resting and varying period contractions come on, the fundus is higher during these. Such pains go on for some time, and then after one of them it can be noted that the bulk of the uterus is decidedly less, and it is more elongated vertically and less transversely. Prior to this last pain, separation of the placenta has been going on, and the placenta is either at a level above the pubes, this being indicated by a swelling in the lower uterine segment felt there, or is partially expelled into the vagina. It is then expelled by intra-abdominal pressure from the vagina, either edgeways (Duncan), or more frequently in an inverted way, the amnion presenting (Schultze mechanism). A retro-placental clot is often present. There is, therefore, a separation of the placenta *in situ* and discretely above the retraction ring prior to expulsion, and finally expulsion. The lessening of the bulk of the uterus separates these two-

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size stages, and is most important. In early descriptions, and even still, these two stages were ignored, and the whole picture grouped as an expulsive phenomenon—a great error.

Schultze's and Duncan's mechanisms do not apply to separation but to expulsion. It was supposed, further, that the shrinking of the placental site due to uterine contraction, separated the placenta and also expelled it—a cardinal error.

(b) *The Study of Specimens obtained from Porro-operations.*—These were specially examined by Barbour, who showed that the placenta was still attached in whole or in part, even when the placental site (uterine) had shrunk from 7" × 7" to 4" × 4". The uterine wall was then greatly thickened. Barbour thought the placenta would separate at a greater shrinkage. The interpretation I urge is that the Porro-Cæsarean operation really shows that placental site-shrinkage does not separate the placenta.

(c) *The Interpretation of certain Frozen Sections where the Interior Aspect of the Uterus is shown in the early First Stage of Labour.*—A most important section is that of Schroeder and Stratz (see Plate) where the early canalisation of the lower uterine segment and cervical canal is displayed and we see how it has happened. The placenta above the retraction ring is unseparated, and therefore demands careful study.

The full-time pregnant uterus is lined by the placenta and membranes. In the deep layer of the basalis and that of the parietalis the well-known layer termed the spongy layer is present, and is formed by the persistent fundi of the uterine glands. This trabecular layer joins, as it were, the uterine muscle to the decidual portion of the membranes and to the basalis. It is here separation of placenta and membranes takes place, and thus when placenta and membranes are expelled, we get the uterine surface of the former covered with a layer of basalis, $\frac{1}{25}$ th of an inch thick, the rest of the expelled placenta in section being made up of compressed villi with decidual septa, intervillous circulation, chorion and amnion. The uterine surface is also lined by basalis with gland ends. The placenta is usually in normal position, *i.e.*, above the level of the top of the lower uterine segment, but may dip into the lower uterine segment constituting the well-known placenta prævia. The lower uterine segment is lined normally by the membranes always, but part of it may of course have placenta in it abnormally. Now we know that the prævial portion of the placenta becomes separate early in placenta

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prævia, and it was Matthews Duncan who first gave the explanation.

Such an eminent obstetrician as my friend Dr Whitridge Williams describes my mechanism as follows: "Hart expressed himself more or less paradoxically, and stated that separation was less the result of diminution in the area of the placental site than of relative enlargement of the placenta, which resulted from the inability of the vessels of the chorionic villi to rid themselves of their contents." This is not my view at all, as I have always stated that it was the uterine placental site that expanded slightly after the pain, and was not followed up by the placenta. The view as given by Dr Williams is quite new to me. The whole matter may be summed up thus:—

1. Membranes in the lower uterine segment separate because the lower uterine segment expands and is not followed up by the membranes.

2. The prævial portion of the placenta separates in this way undoubtedly, as Duncan showed. He once remarked to me that my view was that the placenta separated in the third stage as in placenta prævia, and in this he was right.

3. The only time in the third stage of labour when the placenta separates is not during a pain, but immediately after the pain is over.

4. This excludes the Crédé method for separation of the placenta.

Duncan showed that the separation of the prævial part of the placenta was due to the expansion of the lower uterine segment not followed up by the prævial placenta, and led to its separation and the consequent bleeding. The placenta above the lower uterine segment is not separated until the third stage. Schroeder and Stratz's section shows this precisely when membranes alone are present. We see the lower uterine segment being canalised and increased in area (Plate), the membranes separated and partly cut off artificially. We may put it thus: a disproportion happens between the internal uterine aspect of the lower uterine segment and the membranes at the spongy layer level, *the former being the larger area*, and thus the spongy layer gets torn through and the membranes separated up to the retraction ring. This preparation clearly shows how the membranes are separated from the lower uterine segment, viz., by its expansion, not by contraction.

(d) *Third Stage Specimens removed Post-mortem.*—Here the

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remarkable point is to be noted, that where the placenta is still attached, the uterine wall is only half an inch thick ; where it is separated, the uterine wall is much thicker.

Sections of uteri where the placenta is expelled from the uterus (Varnier's) show the uterine wall as thick as in the Porro cases—the thickness is the result of the placental separation and expulsion, not the cause.

If the membranes in the lower uterine segment are separated by an increase in the area of the lower uterine segment on its uterine aspect, the increase in size of this aspect needs only to be minimal. The question therefore arises: Can we find an analogous mechanism for the separation of the membranes and placenta above the lower uterine segment? If so, it must have a special significance in our management of the third stage, and either support or negative Crédé's views on its management.

THE MECHANISM OF PLACENTAL SEPARATION AND EXPULSION DURING THE THIRD STAGE OF LABOUR.

The membranes are separated from the lower uterine segment in the first stage of labour of an ordinary case: the separation is completed in the layers above the lower uterine segment during the third stage. As to the latter separation, it is supposed to be caused by diminution of the membranes-site, whereas those in the lower uterine segment are really separated by expansion, a contradiction on each side of the contraction ring. The same applies to placenta prævia.

The only possible mechanism of separation for membranes and placenta above the retraction ring is a very slight expansion of their uterine attachment during the period *following* a pain: then the uterine placental site slightly expands, is not followed up by the passive placenta, devoid of the distending circulation (maternal and foetal) in the first and second stages, and thus the spongy layer becomes by degrees, after subsequent pains, torn through. All separations of placenta and membranes, thus follow one rule; there must be a slight increase of the uterine side of their attachment, not followed up by the attached membranes and placenta, and therefore separation. The increase in size of the uterine attachment is small, as the filaments of the spongy layer made up of the epithelium of

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the gland fundi and inter-connective tissue are only about a few μ in length.

It is urged against this view that the mechanism of separation I have urged would lead to hæmorrhage, as in placenta prævia. The lower uterine segment has not, however, the circular-compressing fibres of the uterine body. What causes the softer feeling of the uterus and expansibility of the cavity is obscure. The mechanism of the expansion of the placental site after a pain is not accurately known, but I picture it as slight, as due to the recoil of the elastic uterine tissue after a pain, the muscle not in a normal case expanding.

PRACTICAL RESULTS.

From the above mechanism it is evident that the Crédé practice in order to separate the placenta is inadmissible, as the placenta does not separate during a pain. It was promulgated when the special microscopical anatomy of the spongy layer was unknown, it assumed that the placenta and membranes lay loose in the uterus after the child was born, whereas they are still attached except in the lower uterine segment.

The walls of the third stage uterus are really anterior and posterior, and after the pain there is really a sliding on one another. If one places a halfpenny on the top of a penny, we get a representation of the placental and uterine relations (disproportion) after a pain, the former representing the placenta, the latter the placental site (uterine).

PRACTICAL SUGGESTIONS.

If the Crédé method is used to separate the placenta and membranes above the retraction ring, whether early or late, the result is a great danger, viz., that small bits of placenta and larger pieces of membrane may be left *in utero*. The risk of the former being unseparated and left is slight, but placental tissue over the uterine ends of the Fallopian tubes may be left behind, as I have seen post-mortem. It is often said that the leaving of bits of membranes behind will lead to no harm if the labour has been conducted with all antiseptic and aseptic precautions. This is a most dangerous error. The antiseptic and aseptic precautions we employ are, and always will be, relative, not absolute. We cannot have absolute asepis, and thus when

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dead material is left behind it will necessarily be invaded by micro-organisms, which will break it up, may penetrate further and form their toxins.

The third stage should be managed therefore as follows: The patient should lie at the edge of the narrow bed in the semi-dorsal posture, with the porcelain slipper below. The attendant holds the body of the uterus through the abdominal walls, and can see the external genitals, so as to note if any laceration hæmorrhage is going on.

He does not need in an ordinary case to reinforce a pain when it comes on. This would, if continued, merely so over-stimulate the uterus as to bring on inertia. After each pain the uterus is less firm and the uterine cavity increases in area slightly. How often did one not see when the Crédé method was employed early, that the woman bled, and went on bleeding, the more conscientiously the attendant went on squeezing.

Within the first twenty to thirty minutes, but possibly later, an important change takes place. The uterus becomes smaller as the placenta is now separated and lying in the lower uterine segment, when it can be felt suprapubically; if not, it is in the vagina. Even then one can wait, and often the patient strains and the whole mass is expelled. When emerging, it can be caught in the hand, and one can then feel by a slight tug whether it is free above or tied back by a little tag of membrane in the lower uterine segment.

If the mass lags, suprapubic pressure in the line of the brim-axis, and necessarily on the uterus, will help. Sometimes it is delayed in the vagina if the latter is well curved, but if the gloved finger pulls the posterior vaginal wall back, pressure above will send it out. Time in the third stage is important, and I always impose on myself an hour-limit for it before interfering if hæmorrhage is not going on. The membranes expelled are the amnion, chorion, and compact layer of the parietalis external to these. The cleavage takes place in the spongy layer of the parietalis. The amnion is tough and resistent, the chorion and parietalis are less tough and may not cleave precisely if hurried while stripping off. One should always view the membranes while examining them, through the amnion, so as to see if the layers of the chorion and parietalis are too patchy. If so, one notes it for future guidance, but removal is not necessary or even possible; the amnion is the dangerous membrane when retained.

Causes of Puerperal Septicæmia

THE BEARING OF ALL THIS ON SEPTIC INFECTION.

The Crédé method for the separation of the third stage placenta and membranes has been a very serious error in obstetric technique, and has persisted far too long. Its early use leads to premature interference, and it is my firm belief that its practice has caused great mischief by leaving the cavity of the uterus with bits of unseparated membrane and with thromboses, giving a nidus for infection. Ragged membranes are far too common in hospital and private practice. The placenta and membranes if left alone are separated at first in discrete areas, and if expression is then used the separated parts of membranes especially, get torn away from the unseparated: besides, the deciduæ and chorion are far too patchy when viewed through the amnion.

The sphere of any septic infection by the attendant begins mainly when the head crowns and includes the area bared by the separation of the membranes and placenta. Down to the approaching end of the second stage the chance of infection is slight with the precautions I have detailed (*v.* pp. 229-230). A personal inspection of placentæ and membranes should be made by the obstetric surgeon in hospital on his first visit to hospital and it would be a good thing if the obstetric registrar prepared a record of the state of all placentæ and membranes and of their relation to morbidity and mortality.

Finally, my special suggestion is, that the introduction of the Crédé method is responsible for a rash and loose technique, which must be strenuously combated.

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A PROVISIONAL POINT SCALE FOR THE BLIND.

By W. B. DRUMMOND, M.D., F.R.C.P.E.,
Medical Superintendent, Baldovan Institution.

THIS report is based upon the examination of seventy-three children in Henshaw's Blind Academy, Manchester, and eight children in the School for the Blind, Dundee, by the author; and of fifty-two children in the School of the Royal Blind Asylum, Edinburgh, by Mr A. J. Lothian, Lecturer on Psychology, Edinburgh. The author has already supplied the Medical Research Committee with a Binet Scale for the Blind, and his paper upon this subject, with some additional data, has been accepted by the University of Edinburgh as a thesis for the degree of M.D.* While he was engaged in the work of testing the blind, Dr Thomas H. Haines published a monograph entitled, *Mental Measurements of the Blind: A Provisional Point Scale and Data for a Year Scale* (Psychological Review Publications, 1916). Dr Haines' paper is based chiefly upon the results obtained from the examination of fifty-two totally blind subjects, considered to be of normal intelligence, and he has designedly presented his data in such a form that they can be added to by other observers. As he remarks, data from one thousand blind children will be much more reliable than data from fifty. For this reason the present writer has decided that he will, in the first part of his paper, follow Dr Haines in his method of arranging his results. It may be noted here that Dr Haines examined a number of adults, and very few children under the age of nine (two children of eight and one of seven), while the subjects tested by the writer were all pupils attending school.

Dr Haines summarises his work as follows:—

“Work with the Yerkes-Bridges Point Scale in the examination of Juvenile Delinquents in Ohio had already convinced the writer of the economy of the Point Scale over any other modification of the Binet-Simon Scale, and also of its greater

* This paper formed the basis of a thesis for the degree of M.D. of the University of Edinburgh, and is published with the permission of the University and of the Medical Research Committee. The author is indebted to the Committee for a grant.

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efficiency, both in its aim to measure more definitely psychological processes, and in affording a more ready means of comparison of one person's mentality with that of another. Our results from fifty-two totally blind persons, considered to be of normal intelligence, have already afforded a means of comparison of data from one subject with those from others, which means more for the mental assessment of each one of these fifty-two persons, and of several others of inferior mental endowment, than do results, more laboriously obtained by the Binet Scale. The Point Scale for the Blind, even with this preliminary try-out, reveals its value as a means of throwing suspicion upon the intelligence of several inferior blind children; and of reaching the decision that some others are feeble-minded. On account of the efficiency already shown, and in order to invite the accumulation of further data, these results are put forth as a Provisional Point Scale for the measurement of the intelligence of the Blind. We wish it distinctly borne in mind that the scale is only provisional inasmuch as it has been tried on such a small number of persons. One of the chief recommendations of the Point Scale as such, is that the norms are continually perfected as data are accumulated. They are never perfect. Data from one thousand blind children will be much more reliable than data from fifty. The data from these fifty-two subjects are presented in such form that they may be added to at any time."

The Yerkes-Bridges Point Scale for measuring Mental Ability was published in 1915 (Warwick & York, Baltimore). It included a large number of the Binet tests because these have been thoroughly tried upon a very large scale, but it was the intention of the authors to develop a better method rather than to attempt to modify the Binet Scale. This scale includes some tests which are not suitable for the blind. These have been replaced by others suggested by Terman, Pintner, and other workers. Mr R. B. Irwin, Supervisor of the Education of the Blind, Cleveland, Ohio, himself a blind man, took a special interest in the preparation of the Provisional Point Scale for the Blind, which was used by Dr Haines in his investigation, and also by the writer who obtained copies of it from him in 1915.

A copy of the record blank of the point scale is given here.

W. B. Drummond

Date.....
 Examined by.....
 Name.....
 Home Address.....
 Born.....

OHIO BOARD OF
 BUREAU OF

Record Blank for Point Scale.

1. Naming objects in a basket. 5 Objects, (1). All the 8, (2). (2)
2. Size Weight Illusion, (alternate hands). (2)
3. Repeats: (a) It rains. I am hungry. (2)
 (b) His name is John. It is a very fine day. (2)
 (c) It is not necessary to hurt the birds.
 It is night and all the world rests in sleep. (2)
4. Memory span for digits: (a) 374 581 (1)
 (b) 2947 6135 (1)
 (c) 43871 92736 (1)
 (d) 461572 516283 (1)
 (e) 2749385 6195847 (1)
 (f) 37158264 26149738 (1)
5. Compares, twice: (a) Wooden cylinders, 4 and 6 cm. long. (1)
 (b) Weights, 6 and 15 grams. (1)
 (c) Weights, 9 and 18 grams. (1)
6. Adaptation Board. Over right, (1). Over toward S., (1) (2)
7. Resists suggestions, cubes: (1 for each resistance.) 1.____2.____3.____ (3)
8. Defines: (In terms of use, 1 each; superior to use, 2 each):
 (a) Chair
 (b) Horse
 (c) Fork
 (d) Baby (8)
9. Choose the *nicer feeling*, (a) Serge and silk, (b) velvet and serge,
 (c) velvet and carpet (1 each). (3)
10. (a) Shows examiner's right hand and left hand. (2)
 (b) Faced north, points E., W., and S., (1). Faced east, points S.,
 N., and W., (1). (2)
11. Gives words for three minutes: 30-44, (1); 45-59, (2); 60-74, (3);
 75—, (4). (4)
 1' 30 sec. — 2' — 3' — 4' — 5' — 6' — Total.
12. Differences: (a) Apple and banana (2)
 (b) Wood and glass (2)
 (c) Paper and cloth (2)
13. Finger Tapping. Knox Lines: (a) X. Y. (2)
 (b) B. C. D. (3)
 (c) E. F. G. (3)

A Provisional Point Scale for the Blind

	Admitted.....
ADMINISTRATION	Nationality.....
JUVENILE RESEARCH	School Grade.....
<i>Mental Measurements of the Blind.</i>	Mental Age.....
	Total Credits.....

14. Counts backward : 20-1, (2). One omission or transposition, (1) (2)

15. Reverses series of digits, (1 of 3) (a) 283 427 395 (1)
 (b) 6528 4937 4293 (1)
 (c) 31879 69482 52961 (1)
 (d) 358164 174928 813692 (1)

16. Comprehends questions : (2 each).
 (a) Missed train
 (b) Someone unkind
 (c) Action versus words
 (d) Forgive easier (8)

17. Composes sentence containing *Columbus*, *money*, *river*, or three words of equal difficulty. Three words in two, (2). Three words in one, (4). (Vary the words.) (4)

18. Arranges weights: two trials. All correct but one, (1); correct, (2) (2)

19. Sees absurdity : (1 each)
 (a) Unlucky cyclist
 (b) Three brothers
 (c) Suicide
 (d) Eighteen pieces
 (e) Last car (5)

20. Defines :
 (a) Obedience, (2)
 (b) Charity, (2)
 (c) Justice, (2) (6)

21. Analogies : (a) Oyster is to shell as banana is to.....
 (b) Arm is to elbow as leg is to.....
 (c) Head is to hat as hand is to.....
 (d) Truth is to falsehood as straight line is to.....
 (e) Storm is to calm as war is to.....
 (f) Known is to unknown as present is to..... (6)

22. Puts disarranged sentences together : (2 each)
 (a)
 (b)
 (c) (6)

W. B. Drummond

Date.. .. .
Name
Born..... .

TABLE (Revised)

POINT SCALE FOR THE

GROUP { 1. Blind from Infancy.....
2. Blind from Five Years or
3. Sufficient vision for tapping
4. Sufficient vision for regular

1. Eight objects in a basket. Naming 7 objects. (1)
2. Size-Weight Illusion (alternate hands). (1)
3. Differences : (a) Apple and banana (2)
(b) Wood and glass (2)
(c) Paper and cloth (2)
4. Compares : (a) Wooden cylinders, 4 and 6 cm. long. (1)
(b) Weights, 6 and 15 grams. (1)
(c) Weights, 9 and 18 grams. (1)
5. Chooses the nicer : (a) Serge and silk ; (b) velvet and serge ;
(c) velvet and sacking, (1 each). (3)
6. Counts backward : 20-1, (2). One omission or transposition, (1). (2)
7. Executes Triple Commission. (1)
8. Defines : (In terms of use, 1 each ; superior to use, 2 each) :
(a) Chair
(b) Horse
(c) Spoon
(d) Baby (8)
9. Stick laying : *triangle* (1)
square (1)
diamond (2)
10. Memory span for digits : (a) 374 581 (1)
(b) 2947 6135 (1)
(c) 42871 92736 (1)
(d) 461572 561283 (1)
(e) 2749385 6195847 (1)
(f) 37158264 26149738 (1)
11. Arranges weights : two trials. All correct but one, (1). (2)
12. Gives words for three minutes : 30-44, (1) ; 45-59, (2) ; 60-74, (3) ;
75—, (4). (4)
1st 30 secs. ___ 2nd ___ 3rd ___ 4th ___ 5th ___ 6th ___ Total.
13. Repeats : (a) It rains. I am hungry. (1)
(b) His name is John. It is a very fine day. (1)
(c) The sun is very large and red. Our train was more
than two hours late. (2)
(d) It is not necessary to hurt the poor little birds. It is
night and all the world rests in sleep. (2)

A Provisional Point Scale for the Blind

V.
point scale.)

At School since.....
School Class or Grade.....
Total Points Scored.....

BLIND—RECORD FORM

.....
later.....
test.....
tests of ordinary Point Scale.....

14. Finger tapping. Knox Lines :

X. 1-2-3-4-3.	Y. 1-2-3-4-2.		(2)
B. 1-3-2-4.	C. 1-4-3-2.	D. 1-4-2-3.	(3)
E. 1-3-2-4-3.	F. 1-4-3-2-4.	G. 1-3-1-2-4.	(3)
H. 1-4-3-1-2-4.	I. 1-3-2-4-1-3.	J. 1-4-2-3-4-1.	(3)

15 Reverses (1 of 3) :	(a) 283	427	395	(1)
	(b) 6528	4937	4293	(1)
	(c) 31879	69482	52961	(1)
	(d) 358164	174928	813692	(1)

16. Makes sentences containing *London, money, river* (or 3 similar words).

In two phrases or disconnected clauses, (2). In one good sentence, (4).

17. Comprehension :	(a) Missed train	(2)
	(b) Someone unkind	(2)
	(c) Action versus words	(2)
	(d) Forgive easier	(2)

18. Sees absurdity :	(a) Unlucky cyclist	(1)
	(b) Three brothers	(1)
	(c) Suicide	(1)
	(d) Eighteen pieces	(1)
	(e) Last car	(1)

19. Orientation :	(a) Shows examiner's right hand and left hand.	(1)
	(b) Faced north, points E., W., and S., (1).	
	Faced east, points S., N., and W., (1).	(2)

20. Puts disarranged sentences together :		
	(a) Good dog	
	(b) Exercise	
	(c) Country	(6)

21. Analogies :	(a) Oyster is to shell as banana is to.....	
	(b) Arm is to elbow as leg is to.....	
	(c) Head is to hat as leg is to.....	
	(d) Truth is to falsehood as straight line is to.....	
	(e) Storm is to calm as war is to.....	
	(f) Known is to unknown as present is to.....	(6)

22. Defines :	(a) Obedience	
	(b) Charity	
	(c) Justice	(6)

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GUIDE FOR USE WITH THE POINT SCALE.

A. General Instructions.—It is of the greatest importance to make the subject feel as much at home as possible, because any nervousness or timidity will interfere with the performance of the tests. Speak to him in a friendly way and tell him you have some questions for him to answer. Follow the order of the tests as given in the scale. The easiness of the early tests will tend to give the subject confidence. In the case of young children, begin by asking a few preliminary questions which you are sure the child can answer, such as, "What is your name?" "Are you a boy or a girl?"

Encourage the subject to answer frankly. If he makes a mistake do not appear surprised or annoyed. Do not even correct him, but simply say, "Very well," and go on to the next question. In the case of children some of the tests may advantageously be spoken of and treated as games.

B. Rigid Adherence to Instructions.—It is of the utmost importance to guard against personal variations in the method of putting the tests. Consequently questions and instructions must be given verbatim according to the directions, and no further explanations may be given.

C. Records.—The subject's answers should be recorded as exactly as possible.

D. Scoring.—The points scored must always be noted as soon as the test is completed.

E. The Tests.—1. *Naming Objects.*—Place before the subject a box or basket containing eight familiar objects (doll, baby's shoe, shoe-lace, penny, coat button, marble, ball, and teaspoon). Say, "Here are some things in a box. Take them out and tell me what they are." If he misses any, say, "Are you sure there are no more." Score—5 objects named (1). All the 8 (2).

2. *Size-Weight Illusion.*—*Material.*—Two wooden cylinders of equal weight (55 grammes) and each 35 mm. long, but of different diameters, one being 19 mm. and the other 61 mm. Tell the subject to hold out his hands. Place one cylinder in each hand simultaneously. Say, "Which of these feels the heavier?" Repeat, placing the large cylinder in the other hand. Score (2) if the smaller cylinder is judged heavier *both* times. Otherwise give no credit.

3. *Repeating Sentences.*—Say, "Listen to me, and repeat

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exactly what I say. Don't speak till I have said two sentences. Now, listen." Score (2) for each pair of sentences repeated exactly. If there is *any* error (*e.g.*, connecting the two sentences by "and") give no credit.

4. *Memory Span for Digits*.—Say, "I am going to say some numbers. Repeat them after me exactly." Pronounce the numbers clearly at the rate of two per second. Begin with three digits (*a*). If the subject fails, give him another chance by repeating the numbers in the second column. If he succeeds with either trial, he scores (1), and the examiner proceeds with (*b*), and so on. As soon as the subject fails on both trials for any given number of digits, the test is discontinued.

5. *Comparison of (a) Sticks 4 cm. and 6 cm. long; (b) of weights of 6 and 15 grammes; and (c) of weights of 9 and 18 grammes*.—(*a*) For this test I have used pieces of lead pencil. Place the sticks simultaneously one in each hand of the subject and say, "Give me the long stick." Repeat, placing the long stick in the other hand. Score (1) if *both* responses are correct.

(*b*) and (*c*) The procedure is similar. Say, "Give me the heavier," or in the case of a young child, "Give me the heavy one." Score (1) in each case (*b* and *c*) if both responses are correct. In America Stoelting weighted cubes of wood are used. These are weighted with mercury. I have used corks weighted with shot. The important point is that the weights must be identical in all respects except weight.

6. *Adaptation Board*.—*Materials*.—Use a piece of $\frac{1}{2}$ -in. wood 22 x 28 cm. Through this are bored four holes; the centres of these are 55 mm. from the sides and 70 mm. from the ends of the board. Three of the holes have a diameter of 62 mm.; the fourth one has a diameter of 65 mm. The whole is finished (painted or stained), so there is no obvious difference between the two sides. A circular block is prepared, about an inch thick, and in diameter it is 65 mm. or such size that it will fit easily into the large hole, but will not go into any of the other three.

Procedure.—Hold the board before the subject at an angle of 45 degrees to the table, with the large hole in the upper left-hand corner. Have him feel over the board and ask him, "How many holes do you find?" Then place the round block in this hand, saying to him, "Take this." As he takes it into his preferred hand, say to him, "This block will fit into only one of these four holes. Find which one it will go into." If he finds it goes into the upper left-hand hole without having tried

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each one of the other three, see to it that each one of these is tried that he may know it will go into none of these three. When this is proved the examiner removes the block from the upper left-hand hole, gives it to the subject, and says, "Do it again. Once more put the block into the only hole into which it fits." This should be repeated until the subject places the block into the corner hole without hesitating and without trying it in any other hole. (1) Then have him take the block, at the same time telling him to notice carefully what the examiner is doing with the board, keeping track of it with his other hand. Then the examiner should turn it over from the subject's left to his right. Rotate the left side of the board towards the subject. This turning movement should occupy fully three seconds. It should be done with the subject's co-operation, so that he will notice the changing position of the large hole, but at the same time take care that he does not follow the hole by keeping his finger in it or on its edge. E. then says to him, "Now put the block straight into the only hole that it will fit." Note on the record blank trials of other holes. If it is placed first in the upper right-hand hole, simply record the score (1). (2) E. then proceeds with similar instructions, to turn the board toward the subject so that the large hole moves from upper right to lower right. Record the score as before.

7. *Resists Suggestions.*—*Material.*—One 15 mm. cube; one 22 mm. cube; one 29 mm. cube; and two 36 mm. cubes.

Procedure.—Place simultaneously the 22 mm. cube in the right hand of the subject and the 15 mm. cube in his left hand. Say to him, "Give me the big one." Second, taking both cubes, place simultaneously the 29 mm. cube in his right hand and the 22 mm. cube in his left hand and say, "Give me the big one." Third, taking the other cube, place simultaneously the 36 mm. cube in his right hand and the 29 mm. cube in his left hand. Say to him, "Give me the big one." Take the other cube and place simultaneously two 36 mm. cubes in his hands and say, "Give me the big one." Repeat this two more times. It is well to alternate the large (36 mm.) cubes between the hands. Manipulate the cubes below the table so as to simulate an actual change of blocks.

Scoring.—If the subject *takes the suggestions*, he hands back the cube held in his right hand as the larger one of the equal cubes, in the 4th, 5th, and 6th trials. If he hands back the cube

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in his left hand, or says they are equal, he *resists the suggestions*. The non-suggestible child is very apt to fit the cubes together and feel that the edges are even.

Score.—One point for each one of 4, 5, or 6 given "left greater" or "equal."

8. *Defines "Chair," "Horse," "Fork," "Baby."*—This is one of the Binet tests. Say, "What is a chair?" Score (0) if the child says nothing or simply repeats "A chair is a chair." Score (1) for a definition in terms of use, *e.g.*, "A chair is for sitting on." Score (2) for definitions superior to use, *e.g.*, "A chair is an article of furniture"; "A chair is a seat with four legs and a back"; "A chair is a thing for sitting on." If a child says, "A chair is wood" or "A fork is steel," a score of (1) may be given, but such children should be given a second chance by asking, "Yes, but what *is* a chair?" One cannot give any credit for such replies as "A horse is hair"; "A baby is skin."

9. *Choosing the Nicer Feeling:—Materials*.—Pieces, 3 × 5 ins., of serge, silk, velvet, and Brussels carpet. These must all be of the same colour and shade, so that the blind with some vision can detect no visual difference. Black is recommended. Failing materials of the same colour, the test may be carried out under a cloth, or simply with the subject's eyes shut. Care must be taken in selecting the materials to see that there really is a distinct difference in the feeling. Brussels carpet has a different feeling according as it is felt along or across the ridges. Felt in one way it may not feel rougher or coarser than some serge. Hence a piece of coarse sacking may be preferable to the carpet. The difference should be quite distinct to the average touch.

Procedure.—Place in the two hands of the subject first a piece of serge and silk, and say to him, "Feel these and hand me the one which feels the nicer." Second, have him choose, in the same way, between the piece of carpet and the piece of velvet. Third, the velvet and the serge. Be careful to place the preferable piece now in the right hand and now in the left hand, trying each pair twice.

Score.—Give one point credit for each success. Each preference should be obtained twice, that is, the preferred piece of goods should be preferred when placed both in the right and left hands.

Total.—Three points for three repeated correct preferences.

10. (a) *Shows Examiner's Right Hand*.—Have the subject seated facing the examiner with the knees of the latter within

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easy reach of the subject. Say to him, "My knees are opposite your knees. My hands are on my knees. I am going to ask you a question. Think carefully before answering. Do not answer until I say 'All right.'" Then say, "Show me *my right* hand. Now wait and think." Emphasise "my" and "right." After five or six seconds, say, "All right, now show me." After he has done this, say, "Show me my left hand." Record answers.

Score.—Two points for both hands indicated correctly.

(b) *Orientation.*—The subject, standing, is faced to the north and told he is facing north. He is then asked to point to the east, west, and south. Draw a rectangle upon the record sheet. Mark it north, and draw arrows pointing in the directions which he points for east, west, and south, marking them E., W., and S., mapwise. In like manner face the subject east, tell him he is facing east, and ask him to point south, north, and west. Draw another rectangle upon the record sheet, marking it east and draw arrows indicating the directions in which he pointed for south, north, and west.

Score.—Two points for all directions correct in both trials; one point only if an error is made in one trial.

This test should preferably be carried out in an unfamiliar room. If carried out in a school-room, the child may know that the window is south, the teacher's desk west, and so on.

II. *Gives Words for Three Minutes.*—Say to the subject, "I want you, please, to say as many words as you can in three minutes. Any kind of words, such words as *cloud, dog, chair, happy*, but the point is to say as many words as you can in three minutes. I shall tell you when the three minutes is up. You have nothing to do but think of words and say them." With this the examiner, who has paper and pencil in hand, starts the stop-watch, and writes as many of the words as he can, making dashes for those given too rapidly for him to write. It is desirable to record all the words if possible, as considerable light is shed by this free association upon the mental furniture, the dominant imagery, the kind of experience, the subject has had. It is a very valuable test of the intelligence. In recording, it is of interest to mark the end of each half minute.

Score.—One point for words 30 to 44; two points for words 45 to 59; three points for words 60 to 74; and four points for 75 words or more.

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12. *Differences between Common Objects.*—Say to the subject, "You know what an *orange* is. You know what a *ball* is. How are they different?" The same questions are asked about *apple* and *banana*, *wood* and *glass*, and *paper* and *cloth*. Two differences should be given. Many children are satisfied with giving one difference when they know two. If they stop with one the examiner should say, "Are there any other differences?"

Score.—One point for one difference; two points for two differences for each of three asked.

13. *Finger Tapping.*—This is a modification of the Knox Cube Test, which, as revised by Pintner, is as follows:—

Material.—Five wooden cubes (about $1\frac{1}{4}$ or $1\frac{1}{2}$ in. cube).

Procedure.—Place four of these upon the table between the examiner and the subject, so that they are about two feet away from the subject. The cubes are placed about three inches apart, in a line parallel with the subject's front. Say to the subject: "Do you see these cubes? Now, please watch closely, and do exactly as I do." The examiner now taps out with the fifth cube the lines as indicated. The taps are half a second apart. Having tapped out a line he places the fifth cube upon the table near the subject.

Key to lines.—Cube 1 is to the right of the examiner and to the left of the subject.

A. 1-2-3-4.	X. 1-2-3-4-3.	B. 1-3-2-4.	E. 1-3-2-4-3.	H. 1-4-3-1-2-4.
Y. 1-2-3-4-2.	C. 1-4-3-2.	F. 1-4-3-2-4.	I. 1-3-2-4-1-3.	J. 1-4-2-3-4-1.
	D. 1-4-2-3.	G. 1-3-1-2-4.		

Scoring.—Credit is allowed for each line given correctly. If the subject makes wrong moves, but corrects himself, he is counted correct.

The test has been adapted for the blind as follows:—

The subject places his left hand, or the hand other than that of preference, on his thigh or on the table with the palm up and the fingers spread well apart. A rubber-tipped pencil or similar instrument is used to touch the fingers in the same order as the cubes. The index finger corresponds to cube 1. Gentle but decided impressions should be made. Irwin says there should be half a second between the taps. This rate of tapping, which is correct for the cube test for the sighted subject, seems to me to be too fast, unless it is implied that the time occupied by the touches is additional. But if we allow half a second for each touch and half a second for each interval the rate will be about right. Say to the subject, "I am going to

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touch your fingers one after the other with the pencil. Then I shall give the pencil to you, and I want you to repeat *exactly* what I did." Now proceed to tap out line A, which is 1-2-3-4; *i.e.*, touch successively the tips of fingers, 1, 2, 3, and 4. Then give the pencil to the subject, and show him, if necessary, how to hold it properly. Repeat the experiment as often as necessary until the subject fully understands the procedure expected of him. When he does so, proceed with the lines, X, Y, B, C, etc.

Scoring.—Credit (1) is given for each line correctly given from X to G inclusive. The limits of capacity should be reached for each subject tested. Those who succeed with E, F, or G, should be further tested with the lines H, I, and J, and the result noted, though these lines do not score.

14. *Counting backwards from 20 to 1.*—Say to the subject, "I wish you to count backwards from 20 to 1. Now, 20, 19." Encourage the subject to go on, if necessary, but do not give any further assistance. Score (2) for correct counting; (1) if one omission or transposition is made. For any less perfect result no credit is given.

15. *Reversing Series of Digits.*—Say, "I am going to say some numbers, and I wish you to repeat the same numbers but in the opposite order; thus if I say 7, 4, you will say 4, 7; if I say, 3, 6, 5, you will say 5, 6, 3. Do you understand? Now, listen." Then repeat very distinctly the digits in the series given on the record blank. Name them slowly, at the rate of one per second. Score (1) for each number of digits (3, 4, 5, or 6) correctly reversed on any one of three trials. Total score possible, (4).

Occasionally a subject makes the curious mistake of thinking that he is to arrange the digits named in reversed numerical order; thus, on hearing 3, 6, 5, he will say, 6, 5, 3. Hence one should avoid making use of examples (*e.g.*, 4, 7; 2, 6, 9; 1, 5, 8) in which this procedure would produce the correct answer.

16. *Comprehension Test.*—An intelligent answer is required to the following questions, selected from the Binet Tests.

- (a) If you were going somewhere and missed your train, what would you do?
- (b) If someone hit you without meaning it, what should you do?
- (c) Why should you judge a person by his acts rather than by his words?

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(d) Why can we more easily forgive a wrong act done in anger than the same act done without anger?

Each question is to be read slowly and distinctly, and may be repeated once if the subject does not seem ready to answer promptly. The reply should be recorded in full. Score (2) for an intelligent answer, *e.g.*, "Wait for the next," or "Ask when there will be another"; (1) for a sensible reply indicating a lesser degree of comprehension, *e.g.*, "Go home again."

Question (b) is given by Haines as follows: If someone has been unkind to you and says he is sorry, what should you do? The version given above is Binet's.

17. *Composes a Sentence containing Three Given Words* (London, River, Fortune). Say, "I am going to give you three words, and I want you to make a sentence containing the words. All the words must be in the same sentence. The words are, *London, river, fortune*. Now, try to think of a sentence with these words in it." Record the sentence and the time taken to think of it. When testing children or others in an institution, the words must be varied, as the subjects are likely to talk about the test, and come with a sentence ready. Score (4) for a sentence containing the three words correctly. Score (2) if the words are given in two sentences or two clauses connected by a conjunction.

18. *Arranges Five Weights in order*.—This is the Binet test. The weights are alike in size and shape and weigh 6, 9, 12, 15, and 18 grammes. In America, Stoelting wooden cubes weighted with mercury are used. I use corks weighted with small shot, and padded with wool to keep the shot from rattling. Lead cannot be used for weighting wooden cubes, as a wooden cube weighing 6 grammes will not hold sufficient lead to make up a weight of 18 grammes. Say, "I have here five weights. They are all the same in size, but all differ in weight." Place subject's right hand on the weights, then take hold of his hand, and, using his forefinger as a pointer, proceed, "I wish you to arrange the weights in a row in their proper order. Find the heaviest and place it here, then the next heaviest here, then the next, and the next, and the next," indicating where each weight is to be placed. Record time and order of arrangement. The weights should be distinguishable by some slight mark. Mine are marked in order BINET. Score (2) for correct arrangement; (1) for all correct but one in either of two trials.

19. *Absurdities*.—Say, "I am going to read some sentences

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to you. There is something foolish in each sentence. I want you to tell me what it is." After reading the sentence, say, "Now, what is foolish there?" Note subject's reply, but *make no comment upon it*; simply say, "Very well, now I shall read another." Sentences:—

(a) An unlucky bicycle rider fell on his head and was killed instantly; they took him to a hospital and fear he will not recover.

(b) Someone said, "I have three brothers, John, James, and myself." Common names should be used. If uncommon names are given, children are apt to say that the names are foolish. This, of course, shows a lack of comprehension, which may be due to the unfamiliar names distracting the child's attention from the error he is expected to detect.

(c) Someone said, "If I ever kill myself I will not do it on a Friday, because Friday is an unlucky day and will bring me unhappiness." (A mercenary little boy once gave me the following answer: "I would not do it on Friday, because Saturday is pay day.")

(d) It has been found that the last carriage of a train is the most frequently damaged in a railway accident. Someone thinks it would be a good plan to leave the last carriage off. (It is better not to say "to leave the carriage behind" or the subject may say, "the last carriage is always behind.")

Score (1) for each absurdity discovered. No partial credits.

20. *Definitions of Abstract Terms*—"Charity," "Obedience," "Justice."—Say, "What is meant by 'Charity,'" and so on. The definition of charity must contain two ideas—of kindness shown to someone in need. If the subject says "Love," or "Kindness," say, "Yes, but you must tell me more exactly." If the subject says, "Obedience is to obey," say "What does 'obey' mean?" The definition of justice must express the idea of fairness, of persons being treated as they deserve. If the subject says, "A magistrate," say "Yes, but I do not mean a person. What is 'justice' itself?"

21. *Analogies*.—Begin by saying, "One might say, '*man* is to *boy* as *woman* is to *girl*,' because a man has been a boy, and a woman has been a girl. Again, '*house* is to man as nest is to bird.' Do you understand?" Other examples may be given if necessary. Then say, "Now, will you tell me the answers to the following:—

"(a) *Oyster* is to *shell* as *banana* is to

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- (b) *Arm* is to *elbow* as *leg* is to
- (c) *Head* is to *hat* as *hand* is to
- (d) *Truth* is to *falsehood* as *straight line* is to
- (e) *Storm* is to *calm* as *war* is to
- (f) *Known* is to *unknown* as *present* is to"

Score (1) for each correct analogy found.

22. *Disarranged Sentences*.—The following words are printed in Braille without punctuation, each set upon a separate piece of paper:—

- (a) a defends dog good his master bravely.
- (b) to asked exercise my I teacher correct my.
- (c) for an the at hour early we country started.

Say, "Here is a piece of paper with some words on it. If the words are arranged in proper order they will make a sentence. Try to find out what the sentence is. You must use all the words once, and add no other words." Then help the subject, if necessary, to read the words. Note the time taken to discover the sentence. No definite time-limit can be set. Binet's allowance of one minute for each sentence may not be enough for intelligent blind subjects. A slight variation from the best order may be allowed, *e.g.*, "A dog defends his good master bravely."

Score (2). A sentence correct in form, but indicating less intelligence may score (1), *e.g.*, A good master defends his dog bravely.

(To be continued.)

PERFORATED GASTRIC AND DUODENAL ULCER—90 CASES.*

By J. W. STRUTHERS, F.R.C.S., Assistant-Surgeon, Royal Infirmary,
and Surgeon to Leith Hospital.

WITHIN the last twenty-five years the frequency of perforation of gastric and duodenal ulcers as a cause of peritonitis has come to be generally recognised. Several papers on perforation peritonitis have been read before the Society, the earlier and more important being those by Prof. Caird and Mr Miles. Thanks largely to their work and writing, the clinical features of the condition and the necessity for its immediate treatment by operation are now well known in the area from which the Royal Infirmary and other hospitals in the neighbourhood draw their patients. Cases are diagnosed and sent for treatment as early as may be, and it is probable that few go unrecognised. In the late nineties a case of perforated duodenal ulcer was a rarity; now such cases might be described as among the commonplaces of emergency work, and seem to be increasing rather than diminishing in number.

I have notes of ninety cases of perforated ulcers, seventy-two duodenal and eighteen gastric. Some of my earlier gastric cases are not included because I have no record of them, so that the disproportion in the relative frequency of gastric and duodenal perforation is not really so great as the figures recorded seem to show.

It is not my present intention to analyse these cases in detail. I wish chiefly to emphasise their number. My experience does not, I take it, differ materially from that of my colleagues, and it indicates that these cases are common—far too common. While their absolute frequency is therefore considerable, their relative frequency to all cases of gastric and duodenal ulcer cannot be determined, as there are no statistics available to allow even an approximately accurate estimate to be made. As far as my own experience goes, I may say that I have, during my period of association with the Royal Infirmary and Leith Hospital, operated on and seen operated on a greater number of perforated ulcers than of

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ulcer cases before perforation or other dangerous complication has occurred.

The mortality attending perforation is and must be high. Deaths are nearly all due to delay, unavoidable for one reason or another, in carrying out operation after perforation takes place. The operative treatment is simple but apparently incapable of modification which will enable us to deal successfully with widespread contamination of the peritoneum incidental to delay in carrying it out. Twenty of my own ninety cases died. The general mortality rate is at least 20 to 25 per cent., and there seems no prospect of any material improvement in this death-rate under present conditions. One important fact in relation to this may be recalled in passing, namely, that there is no sign or symptom which indicates that perforation is impending. It is impossible to tell in what cases and when perforation is likely to occur.

As matters stand at present the situation may be regarded as stabilised in this respect that unless cases of gastric and duodenal ulcer are submitted to surgical treatment more often and earlier than has been customary, perforation with its attendant dangers and heavy mortality will remain frequent. Other disastrous end results of ulceration, such as pyloric and duodenal stenosis, hour-glass stomach and carcinoma must also be reckoned in the count against the present methods of treating so-called simple ulcer of the stomach and duodenum.

It seems to me, therefore, that a discussion of the indications for the operative treatment of ulcer would be helpful, to determine whether we must continue to accept the present number of tragic end results as inevitable or whether the earlier adoption of surgical treatment is not possible in order to prevent much suffering and save many lives.

On analysing the histories of the ninety cases of perforation I have treated I find that fifty-four of them had suffered from intermittent or constant dyspepsia of an aggravated type for long periods, the most obvious and important symptom being pain after food. Without entering into a detailed consideration of their symptoms it may be said that their degree and persistence plainly indicated an organic lesion, an ulcer, as their cause. Treatment by dieting, drugs, and rest in bed had been tried in these cases, usually with partial and temporary success, sometimes in hospital but mostly in the patients' own homes.

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Of the remaining thirty-six cases some were examples of rapidly progressing ulcers in which perforation was the first symptom of trouble. The remainder gave histories of relatively minor disturbance, mostly so mild that they had not thought it worth while to apply for treatment.

While eliciting the histories of the fifty-four patients who suffered from severe dyspepsia, it has seemed to me that they were, almost without exception, cases in which early surgical treatment might reasonably have been adopted. They were mostly men belonging to the industrial class, between 20 and 55 years of age, and able-bodied apart from their dyspeptic symptoms. In all, the previous treatment carried out had been of a palliative character, and surgical aid was only called in when the final catastrophe of perforation took place. As has been pointed out, the great majority were cases of duodenal ulcer, and, as we know, the surgical treatment of duodenal ulcer is eminently satisfactory. In seeking an answer to the question as to why these patients had not been sent to the surgeon sooner, one feels driven to inquire of one's medical colleagues what they regard as indications for surgical intervention in cases of chronic duodenal and gastric ulcer.

On turning to the reports of the Royal Infirmary for the years 1913-14, the latest available, I find that there were in the two years, 147 cases of gastric and 63 cases of duodenal ulcer admitted to the medical side, 210 cases altogether. Of these, 31 cases of gastric and 23 cases of duodenal ulcer were sent to the surgical side, 54 out of 210. In only a fourth of the cases, then, was surgical treatment deemed necessary. Without laying too much stress on these figures, they seem to suggest that the majority at least of gastric and duodenal ulcers are regarded as curable by non-operative measures. Forced as we are on the surgical side to deal with so many unfortunate end results of ulceration, it is difficult to resist the suspicion that medical treatment too often results in palliation which is mistaken for cure.

Is it going too far to suggest that in cases of gastric and duodenal ulcer which do not yield promptly and permanently to medical treatment, the patients should be submitted to operative treatment at an early stage of their malady instead of being allowed to drag on until, desperately ill with perforation peritonitis or as dyspeptic wrecks, they are sent to the surgeon to do the best he can for them under a heavy handicap.

THE EFFECTS OF TUBERCULIN IN *LUPUS VULGARIS*.

By ROBERT AITKEN, M.D., M.R.C.P. Ed., Clinical Assistant.

(From the Skin Department of the Royal Infirmary, Edinburgh.)

STATEMENTS have been made to the effect that in the treatment of *Lupus vulgaris* tuberculin not only does no good, but interferes with the efficacy of other remedies. In view of the importance of the subject, Dr Norman Walker asked me to look up those of his cases which had been so treated, and to report the result.

The cases fall into two main classes, viz., those treated exclusively with Koch's New Tuberculin (T.R.), and those in which Koch's Original Tuberculin (O.T.) or Perlsucht Tuberculin Alt (P.T.O.) was given.

The former is a comparatively small class, but in no case does the tuberculin seem to have done anything but good, all the patients who have attended recently showing distinct improvement. Unfortunately there are no photographs, so that pictorial proof is wanting.

Those who received O.T. or P.T.O. may be divided into two sections: those who were taken into the ward every month for a few days to receive an injection of O.T. sufficient to produce a reaction, and those who were treated with smaller doses on the intensive system as outpatients. Some examples of each will be given. Photographs of all these patients were taken, but it is only possible to reproduce a few of these.

CASE I. (Mrs O. D.)—The lupus began in 1898 on the bridge of the nose and was treated with salicylic creosote plaster and scraping. The scraping did a great deal of good, but later the disease broke out again and gradually spread. She came to the Royal Infirmary in 1904, but after receiving several doses of X-rays ceased to attend. For some years nothing at all was done. She returned in 1910 and was again treated by X-rays. In the following year patches appeared on the right cheek and forehead. These were frozen with CO₂ snow, with no very satisfactory results.

She ceased to attend again for two years but returned in April 1913, when she was taken into the ward and given an injection of O.T. The tuberculin was given in gradually increasing doses every month or so

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for a year. After that the Kromayer mercury vapour lamp was applied in addition to the monthly administration of tuberculin, and in January 1915 there was considerable improvement.

CASE II. (Nellie S.)—This patient's lupus began in 1896 when she was 3 to 4 years old. She first came to the Royal Infirmary in 1907 when the disease covered an area about two inches square on the left cheek. She had X-rays, salicylic creosote plaster, and an oleate of mercury ointment between that time and July 1912 when her first dose of O.T. was administered. She received an injection every month for two years. The Kromayer lamp was then applied as well, the application lasting fifteen minutes. The improvement became more marked, the disease becoming much thinner. In January 1915 the extent of the disease was much the same, but the infiltration was very much less. This thinning became more apparent later in the year when the application of the lamp even for five minutes caused a blister, though she had been able to stand the longer application at first without blistering.

CASE III. (Mrs H.)—The disease began in this case in 1876. It appeared first on the right cheek and slowly spread, and four years later a patch appeared on the left cheek. She also had spinal trouble about this time and was admitted to a hospital for incurables, where the lupus was scraped. She was in this institution for eight years but the lupus does not seem to have improved much, though the spinal trouble cleared up. Soon after she left this hospital a patch of lupus appeared on the right side of the nose.

In 1897 she came under the care of Dr Byrom Bramwell who treated her with thyroid extract and the lesions all cleared up. In 1909 there was a recurrence on the left cheek and the lesion gradually spread. The following year she got X-rays which seemed to aggravate the disease. About this time a spot appeared on the nose. Again X-rays were applied but did not seem to have any beneficial effect and the disease spread rapidly.

Early in 1914 she was put on P.T.O. injections and these, she continued till January 1915. She was then started on the intensive method, as she did not find it convenient to come into the ward for three days. There was general improvement, and a month later the patient expressed satisfaction at the progress made.

CASE IV.—Bella M. first came to the department in 1903 when there was a patch of lupus on the inner surface of the upper lip and the adjacent gum, though there had been laryngeal lupus previous to the commencement of the buccal lesions. She had X-rays in 1903 and at intervals in 1904. In 1905 the treatment was X-rays and Finsen light, and in 1906 X-rays again. About this time the lip was nearly well, but a patch appeared on the left ala of the nose.

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This spread in spite of X-rays, carbolic, and oleate of mercury ointment, and in 1908 it attacked the left cheek.

She failed to attend for four years, during which time she was treated by a layman who was said to cure lupus among other things. The disease spread in spite of his treatment and she returned to the Royal Infirmary in 1912. Her attendance during the next three years was very irregular. She was given tuberculin injections during the last twelve months of that period, and there was considerable improvement on the nose and lips though the disease tended to spread on the cheeks.

CASE V.—Andrew M'G. was 9 years old when the lupus started on the site of a former burn of the upper lip. When, at the age of 10, he came to the Royal Infirmary in July 1912, the disease was rather extensive; it was on the nose, upper lip, right cheek, gums, and on each side of the neck below the ear. After his first attendance he did not return for six months when he received an injection of O.T. Then there was another lapse of four months till he was sent by his own doctor for radium treatment, but being an unsuitable case for that remedy he was transferred to the Skin Department. He received X-ray treatment for two months, but the disease spread. During the next fourteen months he received eight injections of tuberculin, and marked improvement resulted.

CASE VI. (George A.)—The disease began in this case in 1905 when the patient was just over a year old. In 1912, when he was brought to the Royal Infirmary, the disease was very extensive, the left side of the face, the groin, both arms, and both legs being affected. During that year and the greater part of the following he had T.R. injections and the oleate of mercury ointment. In August 1913 he was put on O.T. injections. During the next eighteen months he was given nine injections and the Kromayer lamp was used in addition on several occasions. There was great improvement in that time, especially on the places to which the lamp was applied.

CASE VII. (Dorothy B.)—The disease started as a small papule on the right cheek in 1908 when the patient was 7 years old. It had been scraped and X-rayed before she came to the Royal Infirmary in 1911, but the disease had spread in spite of the treatment. In 1911 she had X-rays and CO₂ snow at intervals. Early in 1912 the condition was so catarrhal that she was admitted to the ward and the improvement was great during her three months' stay there. She had some T.R. injections at intervals after she went out, but no treatment got a proper chance on account of the crusting which was allowed to exist. Towards the end of 1912 the disease spread extensively and she was started on the O.T. injections. These were given at intervals of about six weeks till October 1914, when she was

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treated on the intensive method. The photographs show what improvement can be effected by tuberculin even under adverse conditions.

CASE VIII.—Martha L. was 6 years old when the disease began in 1905, and it spread rapidly as she was rather neglected at home. She came to the Skin Department in 1911, and her condition was so bad that she was admitted to the ward at once. In addition to the lupus she had a corneal ulcer and had not been able to open her eye for seven months. She was in the ward for ten weeks, and under X-rays, oleate of mercury ointment, and T.R. injections there was a marvellous improvement.

During the rest of 1911 she attended occasionally when T.R. injections were given. She did not attend again till January 1913, when it was found that she had again been neglected and had lost ground. She was admitted again and received a small dose of O.T. For a month she remained in the ward and went out greatly improved. Her attendance was regular during the rest of 1913, an injection of O.T. being given each time.

In March 1914 the intensive treatment was begun and she was kept in the ward for four months while this treatment was being carried out. The right side had this treatment alone, while the left had the Kromayer lamp at intervals in addition. Both sides improved rapidly, but the left more so than the right. So much was this noticeable that the girl's parents wanted the lamp applied to the right side also. The photographs show the improvement after the treatment. Indeed, the good result was more marked than the pictures would indicate, as the sensitive plate picked out the redness due to the tuberculin reaction more than the human eye did.

This patient has continued to get injections at her home and comes in occasionally to report. The improvement still holds. There is still disease, but it is more in isolated nodules than formerly.

CASE IX. (Mrs G.)—This patient was first seen in March 1913 when the disease had been present only two months. It started as a pimple on the skin in front of the right nostril. During 1913 it was treated with mercury and carbolic plaster, pure carbolic acid and uranium nitrate, but towards the end of the year the disease began to spread towards the point of the nose and also along the nostril. At the beginning of 1914 she was advised to get tuberculin injections from her own doctor. This was done with some benefit till July 1914 when she was started on the intensive method. This was continued till there was difficulty in getting Koch's tuberculin, and so the treatment was not carried as far as one would have wished. Later she was given X-rays, and under this treatment the disease disappeared entirely. She was seen a few months ago when no trace of disease could be found.



CASE VII.



CASE VIII.



CASE X.

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CASE X. (Lilian D.)—The lupus started on the lower part of the nose in 1909, but there was a history of nasal trouble before that. The disease spread rapidly and two spots appeared on the right cheek. About a year after the skin trouble began she came to the Royal Infirmary and had the inside of the nose attended to. This was followed by good results on the skin condition also. The spots on the right cheek were frozen with CO₂ snow about a month after the operation on the nose. The result was excellent, and these spots have not troubled her since. During 1911 and 1912 she had X-rays, CO₂ snow, and T.R. injections. At the beginning of 1913 she was admitted for O.T. injections. Between May of that year and April of the following she had seven injections, and the pictures show the very considerable improvement which resulted. The Kromayer lamp was also used subsequent to the taking of the last photograph, with considerable benefit. This patient later could not be treated owing to the conditions mentioned below, and she went to the London Hospital, where the Finsen light was applied. Whether it was due to X-rays, CO₂ snow, T.R. injections, O.T. injections, Kromayer lamp, or Finsen light, or all of them, the disease disappeared altogether. The patient came up a few months ago to report and no sign of disease could be seen.

CASE XI.—Mrs M'F. was 13 years of age when the disease began in 1904. It appeared outside the left nostril and gradually spread in spite of scraping and X-rays. In 1906 the right nostril was attacked and some time afterwards a patch appeared on the right cheek. She came to the Royal Infirmary in 1910, when it was found that there was intranasal lupus in addition to the skin lesions mentioned.

The nose was dealt with thoroughly and the skin condition was treated with some success, but towards the end of 1912 a patch appeared on the right side of the chin. It was then decided to give her O.T. injections, but owing to family circumstances she did not attend very regularly in 1913 or 1914. During this time practically nothing was done, with the result that the disease spread.

In November 1914 she was put on the intensive method, to which she responded very well. Improvement was rapid and, aided by her removal to the country just outside Edinburgh, continuous. She is now quite cured, and when seen at the end of this summer there was no trace of disease.

The outbreak of war greatly interfered with the treatment of these patients. The supply of Koch's tuberculin was cut off, and the British varieties available at that time did not prove nearly so satisfactory. Again, owing to the staff of the department being depleted it was found impossible to carry on this

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branch of the work, so that the investigations were not carried as far as was thought desirable.

The success attending the tuberculin treatment of lupus may be judged by the very regular way in which most of the patients attended, especially when they were put on the intensive method. The photographs are corroborative evidence of the improvement which can be effected, even by a short course of tuberculin and under very adverse home conditions.

Tuberculin is not held out as the only way of curing lupus, nor as the best way of treating all cases, but there does not seem to be any evidence in the series of cases under review that the injections prevented any other remedy doing good.

CRITICAL REVIEW

BACTERIAL TYPES.

By W. R. LOGAN, M.D., F.R.C.P.E.

THE years of war, which interfered to a great degree with higher research in nearly all countries save America, furnished, nevertheless, a mass of bacteriological records which have had their own value in indicating and initiating many lines of further inquiry. One of the outstanding results of these recent observations has been to emphasise the multiplicity of types of micro-organisms. Almost every organism which has been sufficiently investigated has been found to comprise a group of bacteria, the component individuals of which, while to a greater or less degree resembling each other, are diverse in certain important qualities, of which the most important to us is their capacity of producing disease. This multiplicity of type may, in the first place, be demonstrated by a brief summary of recent observations on a few different organismal infections.

Bacillary Dysentery.—The Flexner group of organisms affords, perhaps, one of the most marked instances of this multiplicity of type. Into this group fall a very large number of organisms which culturally bear a great resemblance to one another, but which more delicate methods show to be distinct; these types include the true B. Flexner, an organism capable of producing severe dysentery with marked toxæmia, and a large number of other organisms which may be ranged in a gradually descending scale of virulence, from dysentery-producing organisms which are only distinguishable from B. Flexner by the most refined tests, to organisms apparently not capable of producing dysentery which can be distinguished from B. Flexner by careful cultural tests without it being necessary to apply the more delicate serological reactions. It may be said here that the term serological test is used throughout this article chiefly to indicate the agglutination test with the determination of the exact end-point of the reaction, and using carefully prepared specific sera; but also, where very closely allied types are in question, to include the still more refined "absorption of agglutinin" test. To turn next to B. Shiga, this organism is the member of a much smaller group of organisms culturally differing from the Flexner group; it includes the very toxic B. Shiga and some other members serologically distinct from that organism, which are apparently much less potent in their capacity of producing dysentery.

These facts have been shown by a large number of workers in

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different parts of the world, and it will be sufficient to quote the authority of the recent papers published by Murray,¹ by Andrewes and Inman,² and by the bacteriologists in the Salonica area.³

Enteric.—It has, of course, been well known for some years that three organisms are responsible for the majority of cases of enteric—*B. typhosus*, *B. paratyphosus A*, and *B. paratyphosus B*. These organisms are culturally as well as serologically distinct. But in addition to these there are serologically distinct types which are from time to time obtained from cases clinically resembling enteric; there are serologically distinguishable types which produce the clinical conditions of the food-poisoning group; and lastly, there are types as a rule distinguishable not only serologically but by some minor cultural differences, which are apparently non-pathogenic.

Cerebro-spinal meningitis.—The work of Gordon,⁴ Flack, Hine, Tulloch, and others has shown that meningitis-producing meningococci may be divided into four types, and that there is, in addition, a culturally indistinguishable group which is apparently non-pathogenic.

Pneumonia.—The Rockefeller workers—Avery, Chickering, Cole, Dochez, and Blake,⁵ and Lister⁶ in South Africa, have been chiefly instrumental in determining the different types in the pneumococcus group. They have shown that there are three types, I., II., and III., which are chiefly associated with acute lobar pneumonia, and which rarely occur in healthy mouths, and a group, called by them for some inexplicable reason "type" IV., which group includes some pneumonia-producing types, but is in the main made up of the saprophytic pneumococci which occur in the throats and mouths of healthy individuals.

The following table quoted from an article by Chickering⁷ shows the relative incidence of the different types of pneumococcus in normal mouths and in the sputum of cases of acute lobar pneumonia. The figures for normal mouths are from papers by Olmstead and Stillman; those for lobar pneumonia were collected at the Rockefeller Institute over a period of some years. These figures do not give the incidence of pneumococci in normal mouths, but the incidence of the types in such cases as were found to harbour pneumococci.

Pneumococcus Type.	Olmstead, 798 cases. Normal mouths.	Stillman, 172 cases. Normal mouths.	Rockefeller Institute, 464 cases. Lobar pneumonia.
	Per cent.	Per cent.	Per cent.
I.	0.6	2.2	33.3
II.	1.2	2.2	29.3
IIA.	11.2	13.6	4.2
III.	13.0	23.4	13.0
IV.	73.8	58.5	20.3

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Type III. pneumococcus is the mucoid type, and is the most virulent of pneumococci so far as the mortality incidence in cases caused by this organism is concerned; the apparent anomaly is observed in the above table that it occurs in a considerable percentage of cases which are free from pneumonia. The reason of this apparent anomaly lies in the mucoid character of the organism, which renders agglutination tests very difficult; it is probable that this type III. pneumococcus is a group comprising at least two types. As pointed out before, type IV. is a large group which contains a certain number of pneumonia-producing types in addition to a large number of saprophytic types, and this explains the occurrence of members of this group in 20 per cent. of cases of lobar pneumonia.

Evidence of multiplicity of type could be given from many other infecting organisms, but the foregoing affords sufficient proof that careful investigation always reveals this divisibility into types.

It is inevitable that these facts should suggest that these kindred but distinct types of bacteria must have evolved at no very remote period from one ancestor. It is evident that, say, the *B. typhosus* and the *B. diphtheria* would have to be traced back a very long way in their family tree before one would expect to come upon a common progenitor. But the question that arises is, how far back must one go to find a common ancestor for, say, a true diphtheria bacillus and a diphtheroid bacillus, or for a type I. and a type II. pneumococcus; or, to put the question in another form, are these bacterial types fixed in their distinguishing attributes, or are they merely phases of the same organism. This is not merely a question of academic interest, but one of vital importance to the whole science of bacteriology.

In the first place, therefore, we may examine some of the work upon pneumococci and meningococci in their relation to disease, as some curiously interesting and suggestive facts have been brought out by these investigations.

The Rockefeller workers have shown⁵ that in cases of lobar pneumonia which have furnished pneumococci of types I., II., and III., these types do not persist in the mouths of cases, save in a very small percentage, after recovery has taken place. Almost invariably these disease-producing types disappear from the mouths of the patients during convalescence, and are replaced by saprophytic members of group IV. pneumococci, or sometimes the mouth remains free of pneumococci of any kind.

This fact at first sight looks capable of but one of two explanations: either that these cases of pneumonia are always produced by an infection by a pneumonia-producing pneumococcus from without, in which case the old theory that pneumonia is produced by the patient's own

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pneumococcus secondary to a lowered resistance in the host would apparently have to go by the board; or that the saprophytic pneumococcus becomes altered into a virulent type secondary to some change within the tissues of the host, and reverts to a saprophytic type after the battle is over, just as a temporary soldier once more becomes a civilian. (Here again it is necessary to emphasise that the distinction between these types is the very delicate but very specific serological one.) If the latter of these explanations be correct, then it follows that a classification of bacteria on a serological basis would be of value only in indicating modifications produced in bacterial species by temporary environmental conditions.

A little more light is thrown upon this question by a further piece of work published in the same report, which is indicated in the following two tables:—

Incidence of Carrier Condition in Healthy Individuals in contact with cases of Lobar Pneumonia.

Types of Pneumococcus in patient.	Total number of contacts examined.	Number of positive contacts.
I.	160	21 = 13.1%
II.	149	18 = 12.1%

Incidence of Pneumococcus Types I. and II. in Saliva of 297 Healthy Individuals not in contact with cases of Lobar Pneumonia.

Type of Pneumococcus.	Incidence.
I.	1 = 0.33%
II.	0 = 0.00%

These figures show that, as might be expected, a considerable percentage of the persons in contact with a case of acute lobar pneumonia become "infected" with the pneumococcus which has produced the pneumonia. Notwithstanding this, the production of acute lobar pneumonia does not, as a rule, follow this communication of the virulent germ; and epidemics of this type of pneumonia, if they ever occur at all, are certainly very exceptional under the conditions in which we live in this country.

These facts suggest, at all events to the mind of the writer, that these organisms do not mutate from one type to another; that pneumonia-producing types are communicated from cases of pneumonia and from carriers to healthy individuals; that they may be carried for a period which is undetermined but which is probably not long, if one

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may judge from their very low incidence in the mouths of healthy people who have not recently been in contact with cases of pneumonia ; and that an attack of acute lobar pneumonia will therefore occur in an individual who is temporarily carrying one of these special pneumococci only secondary to some altered condition within the host of a nature not yet perfectly understood—possibly a lowered resistance, possibly a hypersensitiveness to these bacterial types of a kind similar to that seen in anaphylaxis, possibly secondary to a symbiotic union of the pneumococcus with some unknown infecting virus.

If the meningococcal infections be considered in the same way, a considerable mass of evidence can be produced showing that the serologically distinct varieties of meningococcus similarly do not mutate from one variety to another. Although very closely allied, particularly types I. and III., the four types as studied by Gordon always bred true. In addition, individual cases practically invariably showed the same type of meningococcus in nasopharynx and in cerebrospinal fluid, a fact which afforded no support to the theory that a saprophytic "meningococcus" could become altered in its serological reactions as a result of passage to the central nervous system ; and lastly, that contacts showed when positive always the same "meningitis-producing" type of meningococcus as was present in the case with which they were in contact.

Turning from these observations upon human beings to laboratory experiments, conducted with a view to elucidating these problems, it may at once be stated that morphological and cultural variations are of common occurrence among a large number of organisms. Gram-positive bacteria may temporarily lose their gram-positiveness ; cocci may temporarily show bacillary forms ; bacillary forms may grow in long threads under certain chemical conditions ; a Flexner dysentery bacillus may "acquire" and lose the power of fermenting maltose half-a-dozen times in as many mouths ; a streptococcus of low pathogenicity may "acquire" a high degree of virulence to rabbits and may lose it again. In short, if anyone needs conviction of the variability of at least certain forms of living matter, he will be convinced in a bacteriological laboratory. It is, however, certain that each bacterial species, if such a word is permissible in speaking of organisms whose classification rests on such arbitrary standards, tends always to revert to a certain stamp ; or, to put it in another way, that organism *a* and organism *b* seem to have in their protoplasm certain inherent qualities which tend to make them react to the same environment in a subtly differing manner. And secondly, it will be realised that when a bacteriologist speaks of a pure strain, he is not actually referring to a pure strain but to a culture which has been made from a single colony. When one speaks, therefore, of variations occurring in a micro-organism,

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one is in reality talking of changes occurring in a symbiotic growth of individuals belonging apparently to the same species.

Gurney-Dixon,⁸ in a book recently published, has collected the literature up to the year 1914 on the subject of variation in micro-organisms, and also some instances in which writers claimed to have produced a genuine transmutation of one species of one micro-organism into another. These experiments and others since published cannot be considered in detail here; but, while admitting that temporary variations are of common occurrence, no series of experiments has so far been conducted in which one pure strain has been converted beyond the shadow of doubt into another pure strain. The difficulties in this type of work are enormous, and unfortunately it is practically next to impossible to prove that in passage experiments with animals a contaminating organism from the animal's body has not become included in, or has not entirely displaced, the test culture.

It may be pointed out, however, that these claims as to transmutation do not concern only the fixity of bacterial types within the same group, but also the larger question of the transmutation of bacteria of one group into members of another.

The question as to how far serologically distinct types of organisms within bacterial groups can be regarded as "fixed" is therefore still an open one, although the difference of opinion is only one as to the *degree* of fixity: but we believe that, for practical purposes, the bulk of the evidence goes to show that this separation of organisms by serological tests into different types is not only permissible but is indispensable to progress in the study of bacterial infections.

REFERENCES.—¹ Murray, *Journal of the R.A.M.C.*, Nov. and Dec. 1918. ² Andrewes and Inman, *Medical Research Committee Special Report Series*, No. 42, 1919. ³ Dudgeon, Urquhart, Logan, Taylor, Wilkin, Ryrie, and Bamforth, *Medical Research Committee Special Report Series*, No. 40, 1919. ⁴ Gordon, Flack, Bassett-Smith, Tulloch, and Hine, *Medical Research Committee Special Report Series*, No. 3, 1917. ⁵ Avery, Chickering, Cole, and Dochez, *Monographs of the Rockefeller Institute for Medical Research*, No. 7, 16th Oct. 1917. ⁶ Lister, *Publication No. 2 of the South African Institute for Medical Research*, 1913. ⁷ Chickering, *Boston Medical and Surgical Journal*, vol. clxxi., No. 24, 11th Dec. 1919. ⁸ Gurney-Dixon, *The Transmutation of Bacteria*, 1919, published by the Cambridge University Press.

NEW BOOKS

Mind and its Disorders. By W. H. B. STODDART, M.D., F.R.C.P.
Third Edition. Pp. xvii + 580, with 81 illustrations. London:
H. K. Lewis & Co. 1919. Price 18s.

In this volume Dr Stoddart has developed further the views on psycho-analysis foreshadowed in the second edition, and because of this the book may be looked on as new.

It is more than questionable whether the statement on the front page that it is a text-book for students, is now justifiable; and this for two reasons.

First, the extreme Freudian view is presented in a manner which suggests that no one has any scruples or doubts about its full acceptance: there is not a hint from first to last that any controversy exists on the subject. The view is put forward didactically, without proofs; considering that the author wrote in the second edition that probably too much stress was being laid on psycho-analysis, a change of front of the kind does demand something of the nature of argument. It is not enough to say, "The most superficial analysis of such patients reveals the phallic significance or symbolism (in their minds) of zeppelins, aeroplanes, and bombs." There are many who have devoted as much time as Dr Stoddart to the study of the effects of air raids who have come to no such conclusion, after analyses which were more than superficial.

The second reason why this work seems unsuitable as a text-book is that it is confused. For example, the author states that there are two neuroses and two psycho-neuroses, viz., *neurasthenia*, the *anxiety state*, *hysteria*, and *the obsessional neurosis*. He says that all four own a psychical origin. He seems to feel vaguely that there is confusion somewhere, and tries to justify the distinction by explaining that those labelled neuroses are due to a present psychic cause, those labelled psycho-neuroses to a remote one. Apart from the fact that this is not true, it is not his reason, and if it were his reason, it would not justify his terminology; he should have some words like "neo-neurosis" and "palæo-neurosis." The truth about the matter is, that his master has changed his mind about something, and Dr Stoddart has not been nimble enough to keep pace with him. At one time Freud believed that the conditions he called "neuroses" were physical in origin, and therefore his classification was correct. He now believes they are psychical in origin. Dr Stoddart actually knows this, and the reason why he did not alter

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his nomenclature accordingly is probably because of his father complex towards Freud: it must be presumed that the latter has not yet ordered the change to be made, or that Dr Stoddart has not heard of it.

The book is confused in other ways. It will be remembered that previous editions were marked by a hard materialism. Notwithstanding the author's present interest in the psyche, much of the old mechanical view remains; and the two are not well blended. Strumpell's case, where all forms of sensation were lost except the sight of one eye, is still quoted. When this eye was shut, *i.e.* when all present sensation was in abeyance, the patient became unconscious. This is given even yet as proof that consciousness depends solely on continuous sensation. But what then had become of the energy of the complexes, that manifestation which could not be destroyed? Had it disappeared? It was even in previous editions a surprise that Dr Stoddart could have decided so momentous a question as the nature of consciousness on the word of an obvious hysteric.

With regret it must be said that this book is one which will do much to retard the use of psychological methods in the treatment of disease.

Introduction to General Physiology. By W. M. BAYLISS, M.A., D.Sc., F.R.S. Pp. xiv + 238, with 20 illustrations. London: Longmans, Green & Co. 1919. Price 7s. 6d. net.

This book, following the appearance of the author's *Principles of General Physiology*, and designed to take the place of the larger work as a beginner's introduction, will be welcomed on this account. It must be admitted at the outset that the difficulty of treatment is not overcome or diminished by the reduction in size, but rather the reverse. There are places in the book where condensation has not resulted in clearness, and in a few instances has led to inaccuracy. In the account of the carbohydrates, for example, the definition given would not only exclude starch and cane sugar, but would include acetic acid, and formaldehyde is stated to be the simplest carbohydrate—having 1 carbon atom and 1 molecule of water. And in the section on amino-acids there are little obscure or ambiguous passages, directly traceable to over-condensation, or to a desire to attain simplicity, or to appeal to common knowledge or experience.

But this is not to be wondered at, and, after all, it is the misfortune, rather than the fault, of the physiologist that he has to take the novice over such subjects as the laws of energy, chemistry of colloids, adsorption, electro-chemistry, osmotic pressure, and the permeability of membranes, the electrical phenomena at interfaces, etc., etc., in the first fifty pages of the book. And until chemistry

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sets its house in order, by basing its teaching on a scientific physico-chemical basis, the difficulty will remain.

Apart from this, there is nothing but praise for the work. It is divided into two parts: the larger part is devoted to theoretical discussions and explanations, while the latter part contains clear and concise descriptions of experimental work which can conveniently be performed by the student, and which serve to clinch the arguments. Both parts are admirably fresh and interesting in treatment, and no earnest student of biology could fail to benefit from a careful perusal of it, even though his physico-chemical equipment may not be adequate to enable him to derive the fullest advantage.

A noticeable feature is the commendable absence of unnecessary illustrations.

The Peritoneum. By ARTHUR E. HERTZLER, M.D., F.A.C.S. 2 vols., pp. 870, with illustrations. London: Henry Kimpton. 1919. Price 50s. net.

This work, published in two handsome volumes, represents the outcome of studies by the author extending over a period of twenty years. In the first volume the general question of anatomy, physiology, wound-healing, reaction to infection, and the formation of adhesions are dealt with. The whole represents a searching inquiry into a subject of considerable complexity by one who has brought to bear on the entire field of study a mind which is singularly unbiassed by the passing opinions of the day, and who states his own mature opinion in language which is always emphatic and sometimes picturesque.

The long chapter in Volume I. dealing with the gross anatomy of the peritoneum is unquestionably the feature of the book. Starting from the early development, the author gives a graphic description, aided by excellent illustrations, of the peritoneal folds and fossæ. Incidentally he shows that many of the folds which some latter-day surgeons regard as evidence of pathological change, and to the presence of which they attribute many clinical symptoms, are but slight variations of a developmental process and cannot in themselves be considered as abnormalities. Thus he makes Jackson virtually disown the clinical significance of his membrane as it is generally understood, and Lane's "ileal kink" is dismissed in a sentence as a misconception.

The section dealing with the reaction of the peritoneum to irritation and infection is very full, and bears evidence of much personal investigation. It is the more surprising, therefore, that in this connection so little stress is laid on the value of examining films

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of the fluid exudate, as the importance of this in determining the prognosis of a given case is now fully established.

The more purely clinical part of the work, which occupies the second and larger volume, is uneven and does not quite maintain the standard of the first volume. A long chapter on the pathology of the appendix appears to be somewhat out of place and might with benefit have been omitted. Tuberculous peritonitis is dealt with very fully but is evidently a compilation from the literature, and lacks the personal note so evident in the earlier chapters of the book.

Diseases of the omentum and neoplasms of the peritoneum are exhaustively treated in the concluding chapters. A notable omission here is the lack of any reference to gas cysts of the peritoneum.

This book will rank as a standard work on the subject, and can be cordially recommended to all who are interested in the surgery of the abdomen. It is printed in clear type on heavy paper, with many beautiful original illustrations and a carefully compiled index; its value is enhanced by the bibliography at the end of each chapter.

Experimental Pharmacology. By HUGH M'GUIGAN, Ph.D., M.D.
Pp. xiv + 251, with 63 illustrations. Philadelphia: Lea and Febiger. 1919. Price 8s. 6d.

It is rather difficult to classify American works on experimental pharmacology, such as this volume by Professor M'Guigan from the University of Illinois, without knowing exactly for what purpose they have been devised. They are not complete works on pharmacology though containing a considerable amount of information, and too often this is so briefly expressed as to be rather misleading. For example, the statement that cathartics are best given at night, together with a list of some thirty purgatives, without mention of the time which each or any may be expected to take to act, are apt to confuse rather than help. It appears, also, too general a statement to make that among the six chemical essentials of life is an alkaline reaction, and some might even go so far as to say that it is not true. With regard to the very large number of experiments detailed presumably for performance by the student, many of which are fully described and well illustrated, there seems to be a certain want of sense of proportion or principle underlying the choice of these. It is of very doubtful benefit to a student to let him apply aconitine to, and take a suspensory tracing of, a frog's heart, or to record the action of veratrine on the frog's muscle if the special uses of these lesser used drugs are the objects to be insisted on; but on the other hand, if the value of the experimental method is the real purpose, one or two really important observations are of more value than many repetitions of somewhat archaic experiments, interesting though

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they may be to the scientist. We should prefer one really well-recorded observation of the effect of an emetic on himself or on a fellow-student to the whole of the ten experiments on the animal. Briefly, the scope of the book seems more fitted for the student of pure science than of medicine.

The Microscopic Anatomy of the Teeth. By J. HOWARD MUMMERY.
Pp. 382, with 243 illustrations. London: Henry Frowde
and Hodder & Stoughton. 1919. Price 25s. net.

The author of this book has long been known as a careful and accurate observer who has made many valuable contributions to our knowledge of dental histology, notably in respect to the development and calcification of dentine and to the innervation of that tissue. The publication of the present treatise raises him to the first rank of investigators, and proves him one of the fairest, clearest, and most convincing expositors of the present state of knowledge in a difficult department of minute anatomy. The development of Mammalian teeth is not treated at great length, but the chapter dealing with it is a model of conciseness and precision. In discussing the dental tissues he presents a wealth of information much of which is new and founded on his own researches, and all of which is either illuminative or suggestive. This applies with special force to the sections on the tooth follicle and its connections, and on Nasmyth's membrane. Every consideration is given to the views of other writers, but the summary of each subject leaves us with the impression that Mummery's conclusions are correct, and that we are safe in recommending this book as an authoritative manual of Dental Histology. The illustrations are from preparations and photographs by the author: they are a fit complement to the text.

Symptoms of Visceral Disease. By FRANCIS MARION POTTENGER,
A.M., M.D., LL.D., F.A.C.P. Pp. xiii + 328, with 95 illustrations.
London: Henry Kimpton. 1919. Price 21s. net.

In this book the author attempts to interpret symptoms found in the everyday clinical observation of visceral disease in terms of visceral neurology. It is a study of these diseases from the standpoint of the patient who has the disease. The symptom—not the process of disease—is the study, and this is largely a discussion of "viscero-genic" reflexes, which entails the careful examination of the problems connected with the vegetative nervous system.

Clinicians are not yet generally well informed regarding the importance of the vegetative nervous system in relation to clinical

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medicine, and the present volume is one which will be indeed very valuable. It makes the study of symptomatology a question of pathologic physiology.

This book will also do much for those who wish to understand more clearly the intimate relationship of the various endocrine glands to the vegetative system, and through this to one another. The clinician who has not yet accepted the view that the vegetative nerves and the products of the endocrine glands are the mediums through which visceral symptoms are expressed, would do well to read this monograph, in which the evidence has been carefully stated. Part I. deals with the relationship between the vegetative nervous system and the symptoms of visceral disease; Part II. with the innervation of important viscera and a clinical study of the more common viscerogenic reflexes; Part III. with the vegetative nervous system. This exposition of a subject of great importance in practical clinical work is excellent. There are many illustrations, generally well chosen and very helpful. There is a full table of contents, and index, and suitable references are given at the end of chapters.

Immunity in Health. By KENELM H. DIGBY. Pp. viii + 130. With 31 illustrations. London: Henry Frowde and Hodder & Stoughton. 1919. Price 8s. 6d. net.

The title of this book is misleading: the subject is really an essay on the function of the subepithelial lymphatic glands, chiefly the tonsils, the appendix, and the lymphoid tissue of the intestine. Mr Digby, who is Professor of Clinical Surgery and of Anatomy at the University of Hong Kong, puts forward as his thesis that these subepithelial lymphatic glands occur at situations in the body where there is particular liability to bacterial infection owing to local collection and multiplication of large numbers of micro-organisms, and that the collection of lymphoid tissue, differing in histological structure, in blood supply, and in the absence of afferent lymphatics, from the interstitial lymphatic glands, perform a highly useful function in the destruction of virulent organisms and in the neutralisation of their toxins.

It may be stated at once that many readers will disagree with some of the facts which the author brings forward in support of this theory, and that many more will disagree with some of the conclusions which he draws from these and from other facts. All will feel as the author himself does, that the experimental basis of the theory is very slender, and that much laboratory work remains to be done to supplement the observations upon comparative pathology contained in the volume.

On the other hand, it will be conceded that the subject is one of very great importance both from the standpoint of practical surgery and from a wider scientific point of view, and that Mr Digby has opened it up for further investigation in an able and interesting way.

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Anaphylaxis and Anti-anaphylaxis. By A. BESREDKA. With a Preface by Dr E. Roux. English translation by S. Roodhouse Gloyne. Pp. xiv + 143. London: William Heinemann (Medical Books), Ltd. 1919.

Dr Besredka's qualifications for producing an essay on what is at present known concerning anaphylaxis need no emphasising. He is one of the greatest authorities on the subject. His work has been successful in particular in separating from true anaphylaxis some of these circulatory disturbances included under that name by other writers, and in giving us the method of desensitisation which has already had very important results. In his explanation of the mechanism of anaphylactic shock the author differs from many other authors, including Richet, and his reasons for adopting his views are clearly set forth.

To all who are interested in the subject, and who desire to have an account of the experimental work which has led up to the present theories concerning anaphylaxis, this book can be very thoroughly recommended.

The translation has been well carried out, and a supplementary chapter bringing the book up to date added by the translator.

The Transmutation of Bacteria. By S. GURNEY-DIXON. Pp. xviii + 180. London: Cambridge University Press. 1919. Price 10s. net.

Dr Gurney-Dixon has performed a service in collecting the literature on the subject of variations produced naturally or experimentally in bacteria, and concerning claims by workers to have produced transmutation of bacteria in the laboratory. It is unfortunate that the war has prevented Dr Dixon from bringing his book up to date, as the observations upon which it is based were collected before 1914. But it gives an interesting and complete account of the experimental work which had been carried out in English-speaking countries prior to that date.

The author, after defining his terms and discussing the various environmental conditions which are capable of producing variations in bacteria, then puts forward in detail the evidence regarding variations in morphology, fermenting power, virulence, and pathogenicity. He next discusses the possibility of the occurrence of transmutation in the human body, gives details of some supposed instances of transmutation brought about experimentally, and sums up with a consideration of the evidence.

The only criticism we have to offer is that the author's method has entailed a great deal of unnecessary repetition, but apart from this he

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has been successful in producing a book which will be very useful to bacteriologists.

Surgery of the Lung and Pleura. By H. MORRISTON DAVIES.
Pp. xxiii + 259, with 80 illustrations. London: Shaw & Sons. 1919. Price 25s. net.

Until within comparatively recent years the surgery of the lung and pleura admittedly made less progress than that of any other region of the body. The first step towards its advance was made when Sauerbruch devised his pneumatic cabinet for maintaining the intra-thoracic pressure, but this proved so cumbersome and expensive that a simpler means of attaining this object had to be sought for. This was found in intra-tracheal insufflation, which has rendered even extensive intra-thoracic operations comparatively safe in this particular direction. Radiographic examination has improved diagnosis, and to these advances may be ascribed much of the improvement which has lately taken place.

Mr Morrision Davies has made surgeons his debtors by preparing this handsome and admirably illustrated volume, which embodies his own extensive experience as well as that of other workers in the same field. This work fills a gap in British surgical literature, and should be read by all who are interested in the surgery of the thorax.

Neoplastic Diseases: A Text-Book on Tumours. By JAMES EWING, M.D., Sc.D. Pp. 1027, with 479 illustrations. Philadelphia and London: W. B. Saunders Company. 1919. Price 42s. net.

This text-book includes within reasonable space a full and authoritative account of the origin, structure, and natural history of tumours. It represents the labour of many years, and the author is to be congratulated on the production of a work which deserves to be regarded as a standard book of reference. The introductory chapters are devoted to general oncology, and an adequate account is given of the history of the subject, of the classification of tumours, and of the effects of malignancy on the individual. Such general aspects of the subject as the chemistry of tumours, serology, and ætiology are dealt with in separate chapters. The current theories regarding cancer and the ætiology of special tumours are thoroughly reviewed, and an interesting account is given of the experimental work done in recent years, chiefly on the subject of cancer. Under the heading of special oncology the author gives a detailed description of individual types of tumours, and later refers to special organs and the particular features of the neoplasms

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which occur in them. The text is amplified by numerous illustrations, which are excellently reproduced. Abundant references to the literature are quoted throughout, and at the conclusion of the text there is an index of authors and articles which extends to forty-three pages.

Plastic Surgery, its Principles and Practice. By JOHN STAIGE DAVIS, Ph.B., M.D., F.A.C.S. Pp. xv + 770, with 1637 illustrations. London: Henry Kimpton. 1919. Price 42s. net.

Specialisation has developed in America to a degree unknown in Britain. For over ten years Dr Davis has specialised in Plastic Surgery, and his book proves that intensive study and practice in a limited field produces a standard of work scarcely to be attained otherwise. The scope of the work can be comprehended most readily from the author's own definition: "Plastic and Reconstructive Surgery deals with the repair of defects and malformations, whether congenital or acquired, and with the restoration of function and the improvement of appearance. The deformities dealt with in Plastic Surgery for the most part involve the skin or adjacent soft parts, rather than the bones and joints, the ligaments or tendons."

After an interesting historical review of plastic operations follow excellent chapters on the transplantation of skin and other tissues, on pedunculated flaps and the treatment of wounds. These chapters form the general foundation of the work, and are written in crisp and clear language and are aptly illustrated. The following chapters deal with the application of these general principles to special conditions and to special regions. The book reads easily, and holds the reader interested throughout. The illustrations are copious and instructive. Each chapter has its own bibliography. This book is a masterly treatise on its subject, and will form a useful work of reference to all surgeons whatever special branch of surgery they may practise.

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Encyclopædia Medica. Edited by J. W. BALLANTYNE, M.D. Second Edition. Vol. VI. Pp. viii + 638. Edinburgh: W. Green & Son, Ltd. 1919.

This volume of the *Encyclopædia* contains the articles *Heat Fever* to *Intertrigo*, and within these alphabetical limits a number of important subjects fall, such as Hernia, Hip-joint, Immunity, Infant-feeding, and Insanity, which are all elaborate monographs on the respective subjects of the new articles. Hermaphroditism, by Dr Berry Hart, may be referred to as breaking new ground; Hosing is dealt with by Dr Maxwell Williamson; Immunity is from the pen of Dr W. M. Scott, while the other articles have been revised either by the authors or by some competent authority. The editor and publisher deserve our thanks for having retained the pre-war standard of excellence in production, and this volume need fear no comparison with the earlier ones of the series.

Pulmonary Tuberculosis. By M. FISHBERG. Second Edition. Pp. xii + 744. With Illustrations, 100 Engravings, and 26 Plates. New York and Philadelphia: Lea & Febiger. 1919.

The author informs us that "the purpose of this book is to supply the general practitioner with information concerning the etiology, diagnosis, prognosis, and treatment of pulmonary tuberculosis, its clinical forms and complications." We have no hesitation in stating that the purpose has been accomplished most admirably. Not only will the general practitioner find much information, but we venture to suggest that no specialist's book-shelf will be complete without it. Every aspect of tuberculosis has been touched upon with a freshness of judgment and honesty of expression which adds to the value of the work.

Throughout the author draws a sharp distinction between infection and disease, or as he expresses it, tuberculosis and phthisis.

It is somewhat disconcerting, however, to read that phthisis is at present considered a manifestation of immunity, nor is it very clear what is exactly meant by the statement.

Taking the book as a whole, it appears to us to be one of the best on the subject in the English language that we have at present.

Notes on Books

Organic Chemistry for Students of Medicine. By JAMES WALKER, LL.D., F.R.S. Second Edition. Pp. xi + 332. London: Gurney & Jackson. Edinburgh: Oliver & Boyd. 1919. Price 10s. 6d. net.

Any criticism of the new edition of Professor Walker's admirable text-book is unnecessary, and if his statement in the preface to the first edition, "that the student should be made to realise that he has not done with Chemistry when he has passed his First Professional Examination," seems to have the nature of a pious aspiration rather than that of an expression of an accomplished fact, it is not the fault of the text-book, which points forward with no uncertain finger to the future uses of the subject.

We are afraid, however, that the medical student even of to-day who reads the paragraph on nicotine (which ought to interest him, or her) stating that "the base is lævo-rotatory and highly poisonous," and then looks at the constitutional formula, will confuse the first with a symptom, disbelieve the second, and pass by the formula with a shudder.

NOTES ON BOOKS

It is not necessary for us to do more than record the appearance of new editions of such standard works as Swanzy's *Diseases of the Eye*, twelfth edition (Lewis & Co.); Whittle's *Dictionary of Medicine*, sixth edition (Baillière, Tindall & Cox); Eden's *Manual of Midwifery*, fifth edition (J. & A. Churchill); Rose and Carless' *Manual of Surgery*, tenth edition (Baillière, Tindall & Cox); and Cunningham's *Manual of Practical Anatomy*, vols. i., ii., edited by Professor Arthur Robinson, seventh edition (Henry Frowde and Hodder & Stoughton). These books have long since established themselves, and it is sufficient to say that each in its new form more than maintains its high reputation.

The second edition of *A Guide to Gynæcology in General Practice*, by Comyns Berkeley and Victor Bonney (Henry Frowde and Hodder and Stoughton, 1919, price 31s. 6d. net), is but slightly changed and expanded from the first edition published four years ago. It is so arranged as to be of the greatest assistance to a busy doctor who has met with a patient whose gynæcological condition is rather outside his own experience. Part V., dealing with the medico-legal aspects of Gynæcology, is as helpful as any section of the book. The section on Criminal Abortion has been rewritten and so carefully considered that no one could do better than act on the lines advised

Notes on Books

by the authors should he have the misfortune to be called in to attend a case of this description. New sections on treatment by X-rays and Radium have been added, and the "pros and cons" in this debateable subject are put forward and discussed fairly and without bias. The cases in which they may be used and the advantages of, as well as the dangers associated with, their use are shown with a detachment most refreshing when one considers the operative skill of the authors. The use of radium in post-operative recurrence of carcinoma, in spite of its danger, is worthy of more attention than the authors have devoted to it. Well illustrated, excellently bound, and clearly printed, it is easy to read, and is to be thoroughly recommended.

In *Fractures, Compound Fractures, Dislocations, and their Treatment*, Dr John A. C. Macewen (Maclehose, Jackson & Co., 1919, price 12s. 6d. net) has endeavoured to give an account of fractures and dislocations within a compass of 224 pages. In addition, there is a section on amputations and artificial limbs, and an appendix on the assessment of injuries for compensation. We feel that the author has attempted too much in the space at his disposal. He not only gives a somewhat brief account of the various injuries but attempts to include a description of shock and its treatment, injuries of the brain, lesions of the spinal cord, and of methods of amputation. The result is that most subjects are described too shortly. The lessons of the war with regard to the treatment of fractures receive scanty consideration. The only mention of a Thomas's splint in the treatment of fractures of the lower extremity is in connection with fractures through the narrow part of the neck of the femur. The sections on the healing of fractures and on artificial limbs are interesting, and on the latter subject the writer indicates the conclusions to which he has come as the result of his work at the Erskine Hospital for Limbless Sailors and Soldiers. The book is intended primarily for students.

Mr Philip Turner's small volume on *Inguinal Hernia* (J. & A. Churchill, price 9s. 6d. net) is divided into three parts, dealing respectively with inguinal hernia, the imperfectly descended testicle, and varicocele. In the first part there is nothing new. After discussing the saccular theory of hernia, an operation is described for dealing with the sac by direct exposure of the neck at the internal abdominal ring, similar in every respect to one described in the *British Medical Journal* in 1907, which has been taught in the Edinburgh school for the last twelve years. In the chapter on varicocele the author advocates shortening the supporting structures of the testicle by suture at right angles to the incision, instead of tying the ends of the divided veins together. The book is well printed, and the illustrations clear and good.

Notes on Books

There is in *The Art of Anæsthesia*, by P. J. Flagg, M.D., second edition (J. B. Lippincott Company, price 18s. net), much sound information, and many diagrams and paragraphs which will give suggestions for useful lines of thought to specialists; but the arrangement of the material is peculiar, and might confuse or discourage the beginner in the subject. The author's outlook appears to be almost purely American: the whole subject of chloroform, for instance, receives but the scantiest of notice. In spite of these drawbacks, the book is entitled to a definite place in anæsthetic literature.

The third edition of *Electrical Treatment*, by Wilfred Harris (Cassell & Co., Ltd., 1919, price 9s. net), gives a succinct account of the three chief forms of electricity used in medicine, with their various modifications. One aim is to show the general practitioner how he may use the ordinary galvanic and faradic batteries at his daily work. Of cases suitable for treatment, the author has, like his great precursor Duchenne, found the neurological take front rank; also many conditions in which there is some "disorder of metabolism"; and the neurological leads naturally to the psychological field, in which good results are also claimed.

Captain Harold C. Gage's *X-Ray Observations for Foreign Bodies and their Localisation* (W. Heinemann, price 6s. net) presents in a concise form the methods and apparatus found most useful by the author in the localisation of foreign bodies during over four years of war radiology in France. Methods of marking the position of foreign bodies and making stereoscopic tracings from the screen are shortly discussed, and geometrical localisations are more fully dealt with. The author favours the method originated by Mackenzie Davidson. Ten pages are devoted to the localisation of foreign bodies in and near the eye. The removal of foreign bodies under the screen is advocated, and instruments for this procedure are described.

The author's lucid style and faculty of clear explanation, aided by excellent diagrams and photographs, have overcome the difficulties necessarily associated with a highly technical subject. This book will be of interest to radiologists who aim at a high standard of accuracy in their work.

Dr Frederick Gardiner's *Handbook of Skin Diseases* (Edinburgh, E. & S. Livingstone) gives the essentials of the subject in a concise; practical fashion. It deals mainly, and at greatest length, with the more common diseases, such as final students are expected to be conversant with. There are between 40 and 50 figures—half-tone blocks—in the text, and most of these successfully show the characteristics of the condition illustrated. The book is sure to be popular among students.

BOOKS RECEIVED

- CANNON, WALTER B. Bodily Changes in Pain, Hunger, Fear, and Rage.
New Edition (*D. Appleton & Co.*) 15s.
- COCHRANE, ARCHER W. R., and SPRAWSON, CUTHBERT A. A Guide to
the Use of Tuberculin (*John Bale, Sons & Danielsson*) 5s.
- DACOSTA, JOHN C., Jr. The Principles and Practice of Physical Diagnosis.
Fourth Edition (*W. B. Saunders Co., Ltd.*) 20s.
- DAVIS, EDWARD P. Manual of Obstetrics. Second Edition
(*W. B. Saunders Co., Ltd.*) 15s.
- DEPAGE, A. Ambulance de l'Océan. Tome II., Fasc. II., 1919
(*Masson & Cie.*) —
- HORSLEY, VICTOR, and STURGE, MARY D. Alcohol and the Human
Body. Sixth Edition, enlarged (*Macmillan & Co., Ltd.*) 3s.
- KIRKPATRICK, T. PERCY. Henry Quinn, M.D.
(*Dublin University Press*) 10s. 6d.
- LEFTWICH, RALPH WINNINGTON. An Index of Symptoms. Seventh
Edition. Revised by H. N. Warner Collins (*John Murray*) 15s.
- SAMEY, M. R. Personal Hygiene (*Butterworth & Co. (India), Ltd.*) Rs. 3.
- SOUBEYRAN, P. Les Blessures du Foie et des Voies biliaires
(*Librairie Felix Alcan*) Frs. 12.
- TIMBERG, RICHARD. Home Exercises for Spinal Curvature.
Second Edition (*Wm. Heinemann (Medical Books), Ltd.*) 6s.
- WALSH, JAMES J. Medieval Medicine (*A. & C. Black, Ltd.*) 7s. 6d.
- Zentralblatt für innere Medizin, 1920 (*Johan und Ambrosius Barth, Leipzig*).
Zentralblatt für Chirurgie, 1920 (*Johan und Ambrosius Barth, Leipzig*).
Zentralblatt für Gynekologie, 1920 (*Johan und Ambrosius Barth, Leipzig*).

Messrs H. K. Lewis & Co., Ltd., are the publishers of *A Handbook of Sanitary Law* by R. Burnett Ham, attributed in error in our last issue to another publisher.

ANALYTICAL REPORT.

IGLODINE PREPARATIONS (THE IGLODINE CO., LIMITED).

WE have received a number of the Iglodine antiseptic preparations, which depend for their efficiency on a triad salt of iodine (Tri-iodo-ethyl-phenyl) represented by the formula $C_6H_5 \cdot I_3 + H_2O$. Laboratory investigations have shown that this preparation is a highly efficient germicide in strengths which in no way devitalise the tissues or otherwise interfere with reparative processes in wounds. Iglodine, which is a clear colourless liquid with a pleasant odour, is a chemically pure drug. It has been employed clinically with satisfactory results and is particularly useful in strength of 1 in 40 as an antiseptic for first aid work and for the dressing of contaminated wounds. Undiluted it may take the place of tincture of iodine.

Edinburgh Medical Journal

May 1920

EDITORIAL NOTES

THE following are included in the general list of honours for services in connection with the war, published in the *Honours. London Gazette* of 30th March: Professor Isaac Bayley Balfour, LL.D., M.D., D.Sc., F.R.S.; Major James William Beeman Hodsdon, C.B.E., M.D., F.R.C.S.; and Brevet Lieut.-Col. David Wallace, C.M.G., C.B.E., M.B., F.R.C.S., to be Knights Commanders of the Civil Division of the Order of the British Empire.

AT the commencement of last century, the premier question of preventive medicine was the control of smallpox. For generations this disease had occupied a foremost place amongst the causes of mortality, being always present, and breaking out periodically in epidemics of the greatest virulence. Thanks to the evolution of modern prophylactic measures, this plague of centuries has now become a disease of little everyday importance, and the annual death-rate for which it is responsible—in this country at least—approximates as nearly as possible to zero. No doubt the disappearance of smallpox is partly due to improvements in sanitation, and in the organisation of the public departments concerned with the control of infectious diseases; but medical authorities are agreed that *in the presence of the disease* vaccination still occupies the first place as a prophylactic, and that its power to prevent or modify is proved beyond doubt. Whether or not it should still be employed as a routine measure, when no smallpox is present, is however a matter of no little controversy. The virtual disappearance of smallpox demands that the whole question of its control should be re-examined in the light of modern experience, having due regard to its present-day incidence,

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and possible changes in the type of the disease. It is a well-recognised principle in bacteriology that the virulence of an organism is increased by repeated passage through animals or individuals; and conversely that unless this procedure is available, a great diminution in pathogenicity is likely to occur. Applying this principle to smallpox, it is easy to see that when the disease was endemic or constantly recurring in epidemic form, its virulence should be maintained at a high level; whereas at the present day, it is only to be expected that the type presented should be modified in the direction of relative mildness. Other factors doubtless are also responsible, for it must be remembered that even in pre-vaccination days some epidemics were unusually benign.

In the Milroy Lectures for 1919—now conveniently published in book form under the title of *Half a Century of Smallpox and Vaccination*—Dr John C. McVail gives a concise and most interesting outline of the whole problem in the light of modern epidemics and experience. In prevaccination days, smallpox was normally attended with a high rate of fatality—somewhere between 20 and 30 per cent., but in exceptional outbreaks the death-rate might be much lower. The percentage of deaths increased during the nineteenth century with successive epidemics, and reached its maximum in the great outbreak of 1870-73, when it reached the appalling figure of 45 per cent. among the unvaccinated, and from 8 to 10 per cent. among the vaccinated. The enormous mortality was attributed everywhere to the unusual proportion of malignant, black, and hæmorrhagic cases. Ever since that period the death-rate from smallpox has persistently diminished, being for the 1892-3 epidemic only 8 per cent.: in London, however, in 1901-2, it suddenly rose to 16.8, though in the provinces the mortality was only about 7 per cent. The tables given by Dr McVail show that on the whole smallpox has become much less prevalent and much less fatal, many of the smaller outbreaks being extremely mild in character. In comparing figures, however, allowance must be made for systematic contact hunting, which by bringing to light slight cases which formerly would have gone unnoticed, tends to swell the statistical proportion of mild attacks: allowance must also be made for the effects of vaccination in contacts, who while they may have been vaccinated after exposure just too late to obtain complete protection, develop smallpox in a greatly modified form. At the present day there appear to be two distinct types of smallpox—the severe or African, and the mild or American. In the New World an extremely benign variety of the disease is prevalent; in Trinidad in 1902-3 out of 5256 cases only 28 proved fatal (0.53 per cent.). The source of some of the milder outbreaks in this country has undoubtedly been America; the Nottingham outbreak in 1901 commenced among some Mormon missionaries about twelve days after the receipt by them of a parcel

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from Salt Lake City. A case in Stockport in 1901 was apparently infected from raw cotton imported from Texas, and the medical officer of that state explained that smallpox was quite prevalent, but so mild as neither to demand medical attention nor to compel cessation of work. In the United States, this modified form of the disease has continued, and from 1906-15 the death-rate has not in any year reached 1 per cent. of the cases. There have, however, been inter-current minor epidemics associated with a mortality of from 20 to 28.6 per cent. In this country of recent years the type has tended to be mild, but there have been here also experiences of the old severe form. That both are forms of the same disease is proved by their immunity relations—both are preventible by vaccination. The mild disease was at first regarded as a sport, but if it should gradually replace the severe type, then the latter would have to become regarded as the variation. The pestilence, it appears at the present day, has been reduced to a mere shadow of its former self; it must not be forgotten, however, that the severe African type appears every now and then. There is abundant statistical evidence to show that both the prevalence and infectivity of smallpox have very materially diminished.

In the absence of smallpox, vaccination tends to be neglected by the public. Systematic infantile vaccination has much diminished of recent years since the Act of 1907, which made exemption much more easily obtainable. In Scotland in 1916 amongst children surviving to the age of six months, 41 per cent. were unvaccinated. The doctrine of vaccination has mainly altered in recognising the need for revaccination, and in emphasising the value of recent vaccination when smallpox tends to become prevalent. Calf-lymph has been substituted for humanised lymph, because its purity can be readily controlled, and the supply can be increased rapidly at short notice to cope with the most urgent epidemic. The protection conferred is in direct ratio to the area vaccinated. A contention has recently been advanced that infantile vaccination may actually promote the spread of smallpox, by rendering cases of that disease so mild that they are difficult of recognition. If the practice were really harmful in this way, then routine infantile vaccination should be abolished: this would mean advice to a parent to refrain from vaccinating his child, so that if the child later contracted smallpox it would have so severe an attack as to make the disease readily recognisable, enabling the case to be at once isolated and the public protected. A considerable proportion of such attacks would, of course, prove fatal. It would, argues Dr McVail, surely be wrong to refrain from protecting one individual against severe or fatal smallpox, in order that other individuals should escape the result of omission, by themselves or by their parents, to secure a safety which is open to all. Doubtless vaccination in-

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creases the difficulty of diagnosis, but since infectivity is directly in proportion to the amount of eruption, these milder cases will be much less dangerous from the point of view of spread than others in which the rash is plentiful. It is also true that smallpox is not infrequently overlooked in its severer forms. There is only one conceivable condition which would justify—even demand—the cessation of infantile vaccination. If smallpox were to disappear, so also manifestly would the need for vaccination.

In the methods available for the control of smallpox, vaccination and revaccination at once claim the first place. A striking tribute to the efficiency of recent vaccination is that furnished by the city of Glasgow in 1901-2. It was feared that the threatened epidemic of smallpox would prevent the advent of visitors to the international exhibition which had been organised. Consequently the Corporation entered on a great vaccination crusade, doing everything to encourage voluntary revaccination. The population not recently vaccinated was at first 675,887 in January 1901; by May 1902, 404,855 had submitted to revaccination. From beginning to end, not a single case of smallpox occurred among the recently vaccinated section of the community, and when a year later the disease again reappeared, only one of the 400,000 revaccinated was attacked. Small money payments may help local authorities in controlling vagrants and others who have been exposed to infection, by inducing them to remain in the same locality until all danger is past. Control is also assisted by the statutory compulsory notification; correct diagnosis is essential, and every care must be taken in doubtful cases. The establishment of efficient public health staffs, whose duty it is to undertake the control of contacts and all other measures connected with prevention of disease, places the community of to-day in a position of greater advantage than that of previous generations. The principal measures of control include early notification, isolation of cases, vaccination of attendants and contacts, and disinfection. Smallpox hospitals should be situated away from the general community; they must be of adequate size, and capable of rapid extension. All disinfection must be carried out with thoroughness. Co-operation between local and central authorities is of great value, and also that between neighbouring local authorities. Dr McVail* has rendered a service to the profession and to the community in bringing up to date a question of such importance as smallpox and its prevention. Although the disease has largely disappeared, it cannot be said that the old enemy has yet made his last appearance, and the conclusions arrived at now may prove of much value should such a misfortune happen as the return of epidemic smallpox in a virulent form.

* *Half a Century of Smallpox and Vaccination*, by Dr John C. McVail; pp. 87. Edinburgh: E. and S. Livingstone. N.D. Price 5s. 6d. net.

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REFERENCE has already been made to an almost new development in English medical journalism in the shape of a "Hæmatologica," review of medicine modelled on the *Centralblatt*. In Italy a similar movement is asserting itself, as the appearance of the first number of *Hæmatologica* in January of this year shows. The new journal, published in Naples under the editorship of Ferrata and Moreschi, aims at taking the place of *Folia Hæmatologica* which has for a good many years been the only international review of hæmatology. The *Folia*, which was founded by Pappenheim, is now edited in the neutral town of Zurich by Naegeli, but is still published in Leipzig, and the time has seemed opportune to the Italian editors and a strong staff of collaborators to institute a journal on similar lines in which articles will be published in either Italian, French, or English. The first number of *Hæmatologica* promises well, as all the seven original articles are of a high standard, and are lavishly illustrated by coloured lithographic plates equal to those in which the German printers used to excel. Authors of papers on hæmatological or serological subjects are asked to send reprints or summaries of their work for collective publication in the bibliographical section of *Hæmatologica* to Dr A. Ferrata, Via C. Battisti 53, Naples.

Any question of rivalry with the *Folia* set aside, *Hæmatologica* deserves support on its intrinsic merits. We are sometimes disposed to think that British Science has received scant appreciation in Central Europe, but is it not the case that we also have undervalued a little Italian Medicine? The appearance of this new review should help to remedy this, and we hope that in future issues the names of a strong body of French and British collaborators will appear on the title-page alongside of those of their Italian confrères.

THE first meeting of this newly formed Association will be held in London from 13th to 15th May under the presidency of Sir John Bland Sutton.

**The Association
of Surgeons of
Great Britain
and Ireland.**

The programme includes a discussion on "The Ritual of the Surgical Operation"; discourses on "The History of the War Collection," by Professor Arthur Keith; "Selected Specimens of Wounds of Vessels," by Sir George Makins; and "Gunshot Injuries of the Abdomen," by Sir Cuthbert Wallace. Specimens in the War Collection will be demonstrated at the Royal College of Surgeons; and operations will be performed, and cases shown at various London hospitals.

Appointment.

DR A. FERGUS HEWAT, F.R.C.P., has been appointed Assistant Physician to the Royal Infirmary.

TRANSFUSION OF BLOOD IN PERNICIOUS ANÆMIA.

By JAMES M. GRAHAM, Ch.M., F.R.C.S., Assistant Surgeon,
Royal Infirmary.

SOME of the earliest observations on this subject were made in the Edinburgh School, and the paper read by Brakenridge before the Medico-Chirurgical Society in 1892 aroused considerable interest. The results recorded in a series of five cases were most encouraging, but the subsequent experience of other physicians was scarcely so satisfactory, and Hunter, to quote one authority, not only denied the value of transfusion but regarded it as positively harmful.

Although different methods of transfusion have been employed, in most of the earlier cases sodium phosphate was mixed with the blood to inhibit coagulation. The value of anticoagulants for purposes of transfusion has been amply demonstrated, formerly with sodium phosphate and recently with sodium citrate, in cases of hæmorrhage. The use of substances which alter materially the character of the blood can scarcely, however, be considered the ideal method of transfusion in conditions such as pernicious anæmia. The observations I made in one case, which was transfused twice from the same donor, illustrate the relative value of modified blood and whole blood. Preliminary tests had shown that the donor and the recipient belonged to the same group. On the first occasion citrated blood was used without benefit; fourteen days later the same amount of blood was transfused directly from vein to vein, and the subsequent improvement in the patient's condition and the blood counts proved that the corpuscles were maintained intact in the circulation.

The improvements in technique of whole blood transfusion, which have been evolved in the last decade, and the introduction of agglutination and group tests for selection of the donor, justify a fresh investigation of a means of treatment regarding which there is still considerable doubt and difference of opinion. The progress of cases of pernicious anæmia is so capricious that, unless a considerable series of cases can be observed, the conclusions derived from any one form of treatment cannot be relied on. It is my object, therefore, to analyse the results obtained in a series of twenty-three cases of per-

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nicious anæmia, treated since 1913, and to draw from the facts observed conclusions regarding the value of transfusion in this disease.

To many of the physicians of the Royal Infirmary, and particularly to Professor Gulland and Professor Boyd, I am indebted for the free use of their notes of both private and hospital cases, and for the opportunities afforded me of performing transfusion.

ANALYSIS OF TWENTY-THREE CASES OF PERNICIOUS ANÆMIA TREATED BY TRANSFUSION.

Sex and Age.—Of the twenty-three patients, nine were males and fourteen were females. One patient was between 20 and 30 years of age; eight patients were between 30 and 40; three were between 40 and 50; five were between 50 and 60; and six were over 60 and under 70 years of age.

Duration of Symptoms.—In thirteen of the cases transfusion was called for within one year or less of the first symptoms of anæmia. In six cases the symptoms had existed for from one to two years. The remaining cases were of a more chronic type. In thirteen cases the patient had suffered from one or more relapses. In ten cases, according to the history, the symptoms were progressive.

Number of Transfusions.—Transfusion was performed on twenty-eight occasions. Three patients were transfused a second time (Nos. II., XII., XIX.). One patient was transfused on three occasions (No. XIII.).

Blood Counts at Time of Transfusion.—The number of red corpuscles per cubic millimetre was less than 1,000,000 on seventeen of the occasions on which transfusion was performed. On ten occasions the corpuscles numbered between 1,000,000 and 1,300,000. At the time of the transfusion the hæmoglobin was less than 20 per cent. in six cases, between 20 and 30 per cent. in fourteen cases, and between 30 and 33 per cent. in seven cases.

Methods adopted for Transfusion.—Direct transfusion from artery to vein was performed in nineteen cases, and indirect transfusion from vein to vein in seven cases. Citrated blood was used on two occasions.

Reasons for Transfusion.—The patients were transfused either because they were critically ill and in an apparently

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dying condition, or because the anæmia had persisted or was progressive in spite of the ordinary medical treatment. The cases will be described in two groups, classified according to the reasons for transfusion.

GROUP I.—CASES OF PERNICIOUS ANÆMIA TREATED BY TRANSFUSION BECAUSE THE PATIENTS WERE CRITICALLY ILL OR APPARENTLY DYING.

This group includes eight cases. Transfusion was recommended because the patients' condition appeared otherwise to be hopeless. All of these patients were in a state of collapse, and with the exception of Cases V. and VI. were semi-conscious or comatose at the commencement of the transfusion. One case was *in articulo mortis* and died two minutes before the actual transfusion of blood began. The transfusion of blood from the donor's radial artery was continued for a few minutes, but the attempt to resuscitate the patient failed.

In each of the seven remaining cases the additional blood produced an improvement in the colour of the patient's skin and mucous membranes. Apart from the alteration in colour no improvement in the patient's condition was noted in two cases (Nos. 2 and 3), and both patients died within twenty-four hours.

Temporary Improvement was observed in Three Cases.

CASE IV.—This was an acute case of seven months' duration. On the day prior to transfusion the patient had an attack of syncope. In spite of salines and stimulants she remained collapsed and became unconscious. As her condition was so grave transfusion was recommended. The immediate effect of transfusion was to restore the patient to consciousness. The hæmoglobin was raised from 30 to 40 per cent. and the blood pressure from 95 to 100 mm. The pulse rate was diminished from 116 to 104 per minute. The transfused corpuscles were maintained for a few days, during which the patient's condition was distinctly improved. There was no evidence, however, of reaction on the part of the marrow and death ensued, as was to be expected from the patient's previous condition, fourteen days after transfusion.

CASE V.—The anæmia was acute in this case. Hæmolysis had been particularly active for a period of six weeks prior to transfusion, as indicated by the presence of jaundice and a fall in the red corpuscles

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from 3,400,000 to 1,000,000 in that period. The patient was distinctly better for three days, but soon relapsed into her collapsed condition and died on the fourth day after transfusion.

CASE VI.—The patient, a woman æt. 60, was transfused in the terminal stages of an illness which had lasted for two years. In seven days prior to transfusion her red corpuscles had fallen from 1,500,000 to 920,000 and she was in a dazed, collapsed condition at the time of the operation. Transfusion of 500 c.c. of blood raised the red corpuscles to 1,320,000, and mentally the patient became much brighter. Two days later her condition was reported to be much improved. The benefit conferred by transfusion, however, was only temporary, and the patient's strength gradually failed and she died one week later. At the post-mortem there was fatty infiltration and degeneration of the heart muscle, and the bone-marrow was pale and showed no signs of reaction.

Continued Improvement followed by a Remission was noted in Two Cases.

CASE VII.—Mrs J., æt. 51. The symptoms in this case were of nine months' duration. The patient had been under treatment in hospital for several weeks and had failed to respond to arsenic. The symptoms were more marked than the degree of anæmia. Transfusion was advised because the patient's condition was critical; she was unconscious at the time of the operation. Direct transfusion was performed, the donor's radial artery being connected by metal cannula to the recipient's external jugular vein. Both the median basilic and the basilic vein were too small to take the cannula. After a few minutes the patient's colour notably improved. After fifteen minutes the hæmoglobin was raised from 19 per cent. to 45 per cent., and the pulse became distinctly fuller. The patient also became quite lively. She wakened up, began to look round her, and spoke intelligently; she looked like one who had come out of a dream or a sleep. The remarkable improvement produced by transfusion in this case was maintained, and the patient made steady progress thereafter. Five years later the patient wrote to say that she was in excellent health, although in the interval she had suffered from a relapse.

The following table of blood-counts shows the effect of transfusion in resuscitating the patient and in producing a fresh remission:—

Blood Counts before and after Transfusion. (Case VII.)

Date.	R.B.C.	Hb. Per cent.	C.I.
1.12.14	770,000	19	1.20
8.12.14 (before tr.)	710,000	21	1.30
8.12.14 (after tr.)	1,850,000	45	1.20
9.12.14	2,520,000	45	0.90

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Date.	R.B.C.	Hb. Per cent.	C.I.
11.12.14	2,800,000	48	0.80
13.12.14	2,640,000	45	0.80
18.12.14	2,590,000	40	0.77
23.12.14	2,400,000	42	0.80
30.12.14	3,750,000	55	0.70
4.1.15	3,700,000	56	0.70
5.1.15	3,900,000	60	0.70
8.1.15	3,900,000	65	0.80
20.1.15	4,210,000	65	0.70

CASE VIII.—Miss M., æt. 60. This patient was revived in the most remarkable way by transfusion, although the symptoms soon relapsed and death occurred seven weeks later. Symptoms had first been noticed ten months before transfusion was performed. Reference to the table of blood counts, made by Professor Gulland, will show the profound degree of anæmia and the immediate effect of transfusion. The patient had latterly suffered from nausea and vomiting, and arsenic had to be discontinued. For several days she had been relying on nutrient enemata, but finally these had to be stopped as the sphincters were relaxed and she had incontinence.

When I saw the patient her condition seemed hopeless. She was apparently comatose, breathing heavily, with the mouth open. She was lifted on to the operating table without returning to consciousness.

Direct transfusion was performed, the patient's chauffeur acting as donor. During the operation distinct colour appeared in the cheeks and mucous membranes. The pulse became palpable and the patient began to waken up. At first she did not know where she was or what was being done. Finally she recognised the donor, chatted with everyone, and took a lively interest in the whole procedure.

The immediate improvement was maintained, and the patient was able to take nourishment freely and the administration of arsenic was resumed. For several weeks the blood count kept approximately to the level reached after transfusion. The final fall in the blood count was subsequent to a cold which the patient developed six days before death.

Blood Counts before and after Transfusion.

Date.	R.B.C	W.B.C.	Hb. Per cent.	C.I.
17.9.14	1,620,000	3100	36	1.0
1.1.15 (before tr.)	480,000	1100	13	1.3
3.1.15 (after tr.)	1,250,000	500	30	1.2
28.1.15	1,230,000	1000	23	1.3
12.2.15	1,075,000	3300	30	1.4
18.2.15	670,000	1000	15	1.1

Transfusion of Blood in Pernicious Anæmia

In the above eight cases transfusion was attempted only as a *dernier ressort*. The patients had been treated with arsenic and other medical measures without arresting the progressive nature of the anæmia, and the symptoms in each case were such that the patient's death within a few hours, or a few days at most, seemed inevitable. Although the proportion of recoveries is small, the fact is established that transfusion of blood can resuscitate patients suffering from pernicious anæmia and can prolong life when all other means have been tried in vain. It seems only reasonable that if transfusion is to be tried at all, it should not be postponed till the patient is *in extremis*. Several of the cases of this series were moribund, or so far reduced that the operation could hold out little prospect of prolonging life. One of the patients actually died during the preliminary steps of the operation, before transfusion had been commenced; while a similar case may be mentioned in which the patient died while being transferred to the operating theatre for transfusion.

These cases, of course, are extreme, but they illustrate a tendency that existed in the earlier cases of this series, when the operation of transfusion had been considered, to delay the procedure till too late.

GROUP II.—CASES OF PERNICIOUS ANÆMIA TREATED BY TRANSFUSION BECAUSE THE ANÆMIA WAS PROGRESSIVE OR STATIONARY IN SPITE OF MEDICAL TREATMENT.

Transfusion was employed on twenty occasions in the sixteen cases of this series. The patients were seriously ill, but not in immediate danger of dying. As an immediate result of transfusion the hæmoglobin was raised, in the majority of the cases, by at least 10 per cent., and frequently by more. An immediate improvement in the patient's colour was noticed in each case, and, as a general rule, the alteration in the patient's appearance was striking. The progress of the cases subsequent to transfusion varied. Those cases will first be described in which the improvement was only temporary.

A. Temporary Improvement not followed by a Remission.—In the following six cases the transfusion, while not producing any harmful effect, and sometimes followed by a temporary improvement, failed to cause a fresh remission of the symptoms.

It will be noted in regard to Case XII. that benefit followed a second transfusion.

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In the following table the duration of life after transfusion is noted :—

Case IX.—Death after transfusion	.	.	9 weeks.
" II.—	"	"	6 "
" X.—	"	"	36 days.
" XI.—	"	"	4 months.
" XII.—	"	"	9½ "
" XIII.—	"	"	5 "

The principal facts regarding these cases are as follows :—

CASE IX.—This was an acute case with symptoms of six weeks' duration prior to transfusion. Arsenic had failed to improve the condition of the blood.

Blood Counts before and after Transfusion.

Date.	R.B.C.	Hb. Per cent.	C.I.
2.3.15	1,000,000	24	1.20
18.3.15 (before tr.)	1,110,000	24	1.09
18.3.15 (after tr.)	2,560,000	46	0.90
22.3.15	2,100,000	46	1.00
27.3.15	2,090,000	42	1.05
10.4.15	1,290,000	28	1.17
25.4.15	1,180,000	26	1.20
7.5.15	900,000	22	1.20

From the records of the blood counts it is seen that the transfused corpuscles were fairly well preserved for nine days after transfusion. There was no reaction, however, on the part of the bone-marrow, and the blood picture reverted within a few weeks to its original condition.

CASE II.—This patient had been steadily going down hill after several years of treatment. Arsenic had entirely lost its effect. Temporary benefit followed transfusion; the patient looked and felt stronger and had a better appetite, but, as the accompanying table shows, there was no fresh remission. A second transfusion was performed when the patient was in a dying condition, without prolonging her life.

Blood Counts before and after Transfusion.

Date.	R.B.C.	W.B.C.	Hb. Per cent.	C.I.
8.3.15 (before tr.)	1,200,000	3000	32	1.3
12.3.15 (after tr.)	1,800,000	3400	44	1.2
29.3.15	1,800,000	3000	36	1.0
21.4.15 (before tr.)	590,000	...	12.15	1.2
22.4.15 (after tr.)	885,000	...	17	0.9

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CASE X.—Transfusion was tried as the patient was becoming weaker, after several years of illness, and was not responding to arsenic. The hæmoglobin was raised from 30 to 45 per cent. at the transfusion, but although the patient regained his appetite and improved to a slight extent, there was no evidence of renewed activity on the part of the bone-marrow and death occurred five weeks later.

CASE XI.—The facts of this case were similar to the foregoing. No reaction of any kind followed the transfusion. The hæmoglobin was raised 15 per cent. and the patient felt better for a few weeks; but the bone-marrow was apparently exhausted as the symptoms gradually relapsed and the patient became progressively more anæmic till death occurred four months later.

CASE XII.—The symptoms of this case began about nine months before transfusion, and the patient was already suffering from a relapse. Arsenic was well tolerated but ineffective. The accompanying table shows that the blood count had reverted practically to its former level three days after transfusion of 450 c.c. of citrated blood. It is possible that the citrate solution had diminished the resistance of the corpuscles as a repetition of the transfusion, fourteen days later, from the same donor, was successful.

Blood Counts.

Date.	R.B.C.	W.B.C.	Hb. Per cent.
26.1.12 (before tr.)	637,000	3870	15
26.1.12 (after tr.)	1,925,000	4600	25
27.1.18	1,687,000	4460	28
28.1.18	1,287,500	4300	20
29.1.18	880,000	3940	18
30.1.18	925,000	3950	18
31.1.18	950,000	4050	20

CASE XIII.—This patient was transfused on three occasions. Symptoms of anæmia had been present for over one year. The hæmoglobin had previously been raised to 70 per cent. by treatment, but the symptoms had relapsed and transfusion was suggested as his condition was stationary and giving rise to anxiety. Considerable benefit had followed transfusion some months previously when under the care of another physician. After the first and third transfusions considerable improvement in the patient's appearance and general condition was noted, and was more pronounced than is indicated in the blood counts; 500 and 600 c.c. of blood, respectively, were given on these occasions.

The second transfusion had to be stopped when 250 c.c. of blood

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were given as the patient became breathless, and the donor's blood was obviously incompatible. Some hæmoglobinuria followed, but the patient was not seriously affected.

The blood counts show that even after the first and third transfusions when the blood was perfectly compatible, and caused no reaction, the donor belonging to the same group, that the benefit was merely temporary and that the bone-marrow was not stimulated to fresh activity.

Blood Counts.

Date.	R.B.C.	Hb.
13.7.19 (before tr.)	1,230,000	32
15.7.19 (after tr.)	1,600,000	35
22.7.19	1,520,000	30
29.7.19	850,000	25
7.9.19 (before tr.)	920,000	24
9.9.19 (after tr.)	825,000	20
24.9.19	730,000	16
2.10.19 (before tr.)	680,000	15
3.10.19 (after tr.)	900,000	25
9.10.19	1,010,000	32
11.10.19	850,000	20

The observations made on these six cases show, therefore, that in a considerable proportion of cases of pernicious anæmia, which are refractory to the usual treatment, transfusion of blood also will fail to improve the blood picture, except for a brief period, or to prolong life.

B. Continued Improvement followed by Remission.—In the following twelve cases the immediate benefit conferred by transfusion was continued; a fresh remission of the symptoms was initiated, and the patients' lives were possibly prolonged.

The cases will be divided into two groups and considered separately, according to whether arsenic had been given before transfusion or not.

(a) Observations on Transfusion of Blood in cases of Pernicious Anæmia not treated with Arsenic immediately before or after Transfusion.

In four cases, Nos. XIV., XV., XVI., and XVII., all of which benefited by transfusion, no arsenic was given immediately prior to the transfusion, or for a short period thereafter, so that the effects of transfusion on the progress of the cases could be studied without any complicating factor.

CASE XIV.—The following table of blood counts shows that the

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transfused corpuscles remained intact in the circulation. The subsequent blood counts, prior to the administration of arsenic, remained at much the same level as that reached immediately after the transfusion. It is obvious that the patient was maintaining the improved condition by the output of her own corpuscles, but that the improvement was not progressive till arsenic was administered. Arsenic, therefore, was the important factor in the continued though short remission which followed transfusion.

Blood Counts before and after Transfusion.

Date.	R.B.C.	W.B.C.	Hb. Per cent.	C.I.
23.1.15	630,000	3400	20	1.60
2.2.15 (before tr.)	600,000	6000	18	1.50
2.2.15 (after tr.)	1,240,000	6200	36	1.50
6.2.15	1,050,000	5300	30	1.50
10.2.15	1,200,000	6500	25	1.04
18.2.15	1,260,000	8000	30	1.20
27.2.15	1,280,000	...	38	1.40
5.3.15 (arsenic).				
12.3.15	2,300,000	5300	42	0.90
27.3.15	2,770,000	...	50	0.90

CASE XV.—The improvement following transfusion was maintained, but the remission produced was only slight. The administration of arsenic had no immediate effect, although subsequently the remission became more marked. The facts of the case suggest that arsenic was the important factor in the improvement which followed transfusion.

Blood Counts before and after Transfusion.

Date.	R.B.C.	W.B.C.	Hb. Per cent.	C.I.
2.2.15 (before tr.)	1,030,000	6300	25	1.10
2.2.15 (after tr.)	1,770,000	7000	40	1.10
4.2.15	1,600,000	...	38	1.10
8.2.15	1,940,000	...	44	1.10
16.2.15	1,560,000	5200	34	1.10
26.2.15	1,850,000	5200	36	1.20
5.3.15 (arsenic).				
11.3.15	1,540,000	4000	36	1.20
17.3.15	1,480,000	...	34	1.20
26.3.15	1,770,000	4600	35	1.02
11.5.15	2,400,000	...	60	1.30

CASE XVI.—Arsenic also appeared to be more effective in this case than the transfusion. When arsenic was given, one week after the transfusion, it was apparent that, although the patient was still greatly improved, the improvement was not progressive.

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Blood Counts before and after Transfusion.

Date.	R.B.C.	W.B.C.	Hb. Per cent.	C.I.
10.2.15	1,500,000	4300	35	1.10
16.2.15 (before tr.)	1,280,000	3500	25	1.04
16.2.15 (after tr.)	2,400,000	3600	48	1.00
23.2.15	2,070,000	4000	40	1.00
24.2.15 (arsenic).				
2.3.15	2,560,000	4400	50	1.00
11.3.15	2,710,000	6200	57	1.05
31.3.15	3,600,000	...	66	0.90
3.4.15	3,780,000	6200	65	1.10

CASE XVII.—In this case also the administration of arsenic was the more important factor in the comparatively slight remission which followed transfusion, although nine days after transfusion, as the blood counts show, the corpuscles and hæmoglobin were still considerably increased compared to their proportions prior to the operation.

Blood Counts before and after Transfusion.

Date.	R.B.C.	Hb. Per cent.	C.I.
1.4.15 (before tr.)	1,140,000	28	1.3
8.4.15 (after tr.)	2,050,000	40	1.0
10.4.15	1,550,000	34	1.1
12.4.15 (arsenic).			
15.4.15	2,200,000	40	0.9
22.4.15	2,160,000	33	0.8
10.5.15	2,550,000	40	0.8
20.5.15	2,610,000	42	0.75

The above four cases show, therefore, that while transfusion alone may diminish the anæmia, a fresh remission does not necessarily follow unless arsenic is given. It is obvious in these cases that arsenic, given from the first, might equally well have produced the results ultimately obtained. On the other hand, it is possible that the undoubted improvement in the condition of the blood and in the patients' general health, which was due to the transfusion, prepared the way for, and favoured the subsequent response to arsenic.

The remaining cases in this series received arsenic both before and after transfusion, and the remission which followed can be fairly attributed to the transfusion of blood.

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(b) *Observations on Cases of Pernicious Anæmia in which Arsenic had failed to produce a Remission and which benefited by Transfusion.*

CASE XVIII.—The patient had been ill for three and a half years, and was suffering from a second relapse. The anæmia was progressive and the patient was intolerant of arsenic. At the time of the transfusion her condition was serious; she was collapsed, restless, and suffered from almost constant nausea and retching. The hæmoglobin was raised 5 per cent. by the transfusion, and the patient became quieter, and the pulse and blood pressure were improved. Two hours after transfusion numerous nucleated red corpuscles were found in the films. Three days after the operation the patient was remarkably improved. Sickness and diarrhœa had completely stopped, and it was possible to resume the administration of arsenic. Although the blood counts did not reach normal, they became better than they had been for a period of one year prior to transfusion. When last seen, six months after transfusion, the patient was in good condition.

Blood Counts before and after Transfusion.

Date.	R.B.C.	Hb.	C.I.
		Per cent.	
8.3.14 (before tr.)	700,000	25	1.7
8.3.14 (after tr.)	...	30	...
28.4.14	2,250,000	50	1.39
13.5.14	2,500,000	65	1.3

CASE XIX. (two transfusions).—Judged by the increase in the blood counts alone, the patient's condition was much improved by transfusion on both occasions. The patient had been in hospital for eighteen days, and had received arsenic for ten days, without improvement, before transfusion was advised. The transfusion started a fresh remission of the symptoms. Improvement after the first transfusion was not prolonged, but transfusion again had a remarkable effect, as is shown in the table of blood counts.

Blood Counts before and after Transfusion.

Date.	R.B.C.	W.B.C.	Hb.	C.I.
			Per cent.	
20.3.15 (before tr.)	980,000	1000	24	1.3
26.3.15 (after tr.)	2,660,000	3200	52	0.98
27.3.15	2,300,000	3200	48	0.96
28.3.15	2,470,000	3600	46	0.94
29.3.15	2,720,000	4800	49	0.89
11.4.15	2,300,000	4000	45	0.98
22.5.15	2,400,000	...	54	1.1

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Date.	R.B.C.	W.B.C.	Hb. Per cent.	C.I.
2.10.15 (before tr.)	900,000	6000	28	1.5
2.10.15 (after tr.)	2,500,000	3600	73	1.4
4.12.15	3,000,000	...	90	1.5

CASE XX.—This case had been in hospital and had received arsenic for one month before transfusion was performed; the anæmia had not yielded to treatment and his condition was stationary prior to transfusion.

Blood Counts before and after Transfusion.

Date.	R.B.C.	W.B.C.	Hb. Per cent.	C.I.
12.2.16 (before tr.)	1,100,000	3000	22	1.00
13.2.16 (after tr.)	3,500,000	5000	55	0.79
16.2.16	2,400,000	...	40	0.83
29.2.16	2,500,000	6000	35	0.70
13.3.16	3,170,000	6400	40	0.64
20.3.16	2,600,000	5000	40	0.77
26.3.16	2,060,000	4500	40	1.00
18.4.16	3,000,000	...	60	1.00

The remarkable increase in the red corpuscles and hæmoglobin which immediately followed transfusion was associated with improvement in the patient's symptoms. The subsequent counts did not vary much, but they were made over a period of fourteen weeks, which was sufficiently long to show that the continued improvement was due to a fresh remission and reaction on the part of the marrow.

CASE XXI.—This patient had been ill for a few months only, and had become progressively weaker and more anæmic in spite of the usual treatment, including arsenic. For some weeks prior to the transfusion the patient, although not suffering from sickness, had lost all desire for food, and arsenic also did not seem to suit him. After the transfusion his appetite was much improved and arsenic was better tolerated than it had been before. Only two observations on the blood, as indicated below, were made, but the improvement, both immediate and subsequent to transfusion, was undoubted. The patient continued to improve after the date on which the last blood count was taken, and recovered sufficiently to return to work for a short period.

Blood Counts before and after Transfusion.

Date.	R.B.C.	Hb.	C.I.
25.6.16 (before tr.)	1,000,000	25	1.25
25.5.16 (after tr.)	...	35	...
28.6.16	1,520,000	35	1.1

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CASE XXII.—This patient had been ill for two years, and at the time of the transfusion was very weak. Arsenic had entirely failed to arrest the progress of the anæmia. Observations on the blood were made immediately before and after transfusion, but not subsequently. The hæmoglobin was raised from 20 to 30 per cent. After transfusion the patient made steady progress and a fresh remission was initiated.

CASE XXII.—This case was transfused twice, and the facts of the first transfusion have already been referred to. The second transfusion was performed thirteen days later, and was successful. The patient had previously benefited from arsenic, but had suffered a relapse, and on this occasion neither arsenic nor the first transfusion of citrated blood improved the blood count. From the accompanying table it is apparent that the corpuscles were maintained after the second transfusion with whole blood, and that the continuance of the improvement was due to the fresh output of corpuscles. The second transfusion supplied the stimulus to the bone-marrow necessary for the onset of a remission.

Blood Counts before and after Transfusion.

Date.	R.B.C.	W.B.C.	Hb. Per cent.
26.1.18 (before tr.)	637,000	3870	15
26.1.18 (after tr.)	1,925,000	4600	25
27.1.18	1,687,000	4460	28
28.1.18	1,287,500	4300	20
29.1.18	925,000	3950	18
31.1.18	950,000	4050	20
9.2.18 (before tr.)	770,500	2083	20
9.2.18 (after tr.)	1,775,000	4486	30
10.2.18	1,875,000	4760	29
11.2.18	1,687,500	4160	28
12.2.18	1,650,000	4761	26
13.2.18	1,575,000	4573	26
21.2.18	1,900,000	3750	28
28.2.18	1,950,000	4000	28
5.3.18	1,937,000	...	34

CASE XXIII.—This patient, a man æt. 45, had been ill for one year, and had been in hospital for a period of four weeks, during which he received the usual medical treatment, including arsenic, without any alteration in the blood counts or relief of symptoms. Transfusion was recommended by Professor Boyd, as his condition was stationary. 500 c.c. of blood were transfused from vein to vein by syringes and two-way stopcock apparatus. In spite of careful preliminary agglutination tests a considerable reaction followed the

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transfusion, but the patient, from the fourth day onwards, made steady progress and has subsequently remained well and able to do a full day's work.

Blood Counts before and after Transfusion.

Date.	R.B.C.	Hb.
24.4.19	1,020,000	30
3.5.19	999,000	28
13.5.19	919,000	32
26.5.19	920,000	32
29.5.19 (transfusion).		
2.6.19	...	38
6.6.19	1,550,000	45
16.6.19	1,650,000	50
17.6.19	2,480,000	50
9.7.19	3,500,000	75
21.7.19	4,000,000	...

It will then be seen that transfusion was beneficial and instrumental in starting a fresh remission in twelve out of sixteen cases of pernicious anæmia which were seriously but not critically ill. In four of the twelve cases which benefited, however, arsenic was the chief factor in the subsequent remission. In the remaining eight cases, transfusion succeeded in initiating a remission of the symptoms when arsenic had been previously given without effect.

From the description of the cases in Groups I. and II. it is obvious that the effects of transfusion in refractory cases of pernicious anæmia cannot be readily anticipated. Patients in a semi-conscious and dying state may occasionally be revived in the most remarkable manner, while other cases, not so seriously ill, may receive no benefit. The main features of the cases which did not benefit by transfusion are shown in the following table:—

CHARACTERISTIC FEATURES OF CASES OF PERNICIOUS ANÆMIA NOT BENEFITED BY TRANSFUSION.

A. Moribund or apparently dying cases.

Case.	Duration of symptoms.	R.B.C.	Hb.	C.I.	Result.
IV.	7 months	900,000	30	1.67	Death in 14 days
IIA.	5 years	570,000	12-15	1.2	„ 24 hours
V.	18 months	1,000,000	30	1.5	„ 4 days
III.	6 „	500,000	15	1.5	„ 24 hours
VI.	2 years	920,000	30	1.7	„ 7 days

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B. Cases seriously but not critically ill.

Case.	Duration of symptoms.	R.B.C.	Hb.	C.I.	Result.
IX.	8 weeks	1,110,000	24	1.09	Death in 9 weeks
II E.	5 years	1,200,000	32	1.3	" 6 "
X.	4 "	1,300,000	35	1.3	" 36 days
XI.	9 months	...	38	...	" 4 months
XII A.	9 "	637,000	15	1.4	" 9 "
XIII A.	12 "	1,230,000	32	1.3	" 5 "
XIII B.	12 "	920,000	24	1.3	
XIII C.	12 "	680,000	15	1.1	

In the above cases transfusion did little to arrest the progress of the anæmia or to prolong life. All of the cases had been treated previous to transfusion in the usual way, without success.

Two of the cases (Cases II A. and X.) were of a chronic type and transfusion was tried without effect in the terminal stages of the disease. Cases III. and IX. were of an acute type, the anæmia having been progressive since the onset of symptoms. In the remaining cases also the symptoms were of comparatively short duration and relapses had already occurred. Five of the cases were regarded as being critically ill, and in all of them the symptoms were pronounced and, except in one case, there was pyrexia. In one case (No. V.) the blood destruction had been particularly rapid for a few weeks prior to transfusion, and the patient was jaundiced; except in this case and in two others there was a previous history of hæmorrhages having occurred.

The colour index of these cases, although varying considerably, was on the whole higher than in the cases which were benefited by transfusion. Except in Cases II A., III., XII A., and XIII C., the blood corpuscles and hæmoglobin were not reduced to a specially low degree, and the severity of the symptoms was often greater than the examination of the blood would have suggested; this could be attributed either to the acuteness of the anæmia or to the pronounced secondary changes in the organs. The blood films showed the absence of reaction on the part of the bone marrow, but the type of cells varied to a considerable extent; the observations were not sufficiently detailed to establish a typical picture for this group of cases, or to enable the prognosis to be deduced accurately from the appearance of the films.

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The failure of Case XIII.A. to improve was attributed to the use of the citrate method of transfusion. In one case also (XIIIB.) the blood proved to be incompatible, although on two other occasions the same patient was little benefited by compatible blood from a different donor.

CHARACTERISTIC FEATURES OF CASES OF PERNICIOUS ANÆMIA BENEFITED BY TRANSFUSION.

A. *Moribund or apparently dying cases.*

Case.	Duration of symptoms.	R.B.C.	Hb.	C.I.	Result.
VII.	9 months	710,000	21	1.3	Alive 5 years later
VIII.	10 "	480,000	13	1.3	Death in 7 weeks

B. *Cases seriously ill but not moribund.*

Case.	Duration of symptoms.	R.B.C.	Hb.	C.I.	Result.
XVIII.	3½ years	700,000	25	1.7	Alive 6 months later
XIV.	1 year 9 months	600,000	18	1.5	Death in 13 months
XV.	1 year	1,030,000	25	1.1	" 10 "
XVI.	1 "	1,280,000	25	1.04	" 12 "
XVII.	1 "	1,140,000	28	1.3	" 10 "
XIXA.	6 years	980,000	24	1.3	" 16 "
XIXB.	...	900,000	28	1.5	...
XX.	15 months	1,100,000	22	1.0	" 6 "
XXI.	Several months	1,000,000	25	1.25	" 4 "
XXII.	2 years	800,000	20	1.2	...
XIIIB.	10 months	770,000	20	1.3	" 10 "
XXIII.	1 year	920,000	32	1.7	Alive 6 months later

In the above cases, which responded to transfusion and in which there was a remission of the symptoms for a variable period, there was no outstanding feature which enabled the effects of transfusion to be anticipated, or which characterised the group. The degree of anæmia was quite as marked as in the cases which transfusion failed to benefit, and two of the cases were unconscious and apparently dying at the time of transfusion. The colour index was not, as a rule, so high, and the duration of the symptoms was rather longer than in the previous group. In most of the cases in this group the temperature was either normal or only slightly irregular, and the absence of a marked evening rise of temperature undoubtedly increases the prospects of benefit from transfusion.

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For this reason, I think it is probable that the irregular temperature in pernicious anæmia is partly due to toxæmia, and not solely to the presence of anæmia.

EFFECTS OF TRANSFUSION ON THE SYMPTOMS AND SIGNS OF PERNICIOUS ANÆMIA.

The beneficial effect of transfusion showed itself in various ways, and was most striking in the cases which were critically ill at the time of the transfusion. Most of the patients were dull and apathetic, and their mental processes were immediately stimulated by the increased volume of blood in circulation. In favourable cases the symptoms attributable to deficiency of the circulation, such as shortness of breath and palpitation, became less noticeable, and often were markedly relieved. It was observed in the cases with an irregular temperature which responded to transfusion that the temperature gradually returned to the normal, and remained normal as long as the progress was continued.

Effect of Transfusion on Gastro-intestinal Symptoms.—It was frequently noted that the appetite and powers of digestion were increased, and this, of course, in itself was an important factor in the patient's recovery. Many of the patients suffered from nausea, vomiting, and diarrhœa, and frequently it was impossible either to feed them or to treat them adequately with arsenic.

The severer gastro-intestinal symptoms, commonly present in advanced cases, do not necessarily disappear immediately as the result of treatment directed solely to the correction of the anæmia. The septic condition of the intestinal tract or other factors may be responsible for the dyspeptic symptoms. Certain of the cases, however, recovered their appetite and lost the nausea and sickness so soon after transfusion that it seemed probable that the profound degree of the anæmia was responsible for the symptoms. Deficient oxygenation must interfere with the functions of the digestive organs, and the patient's capacity for assimilating nourishment may therefore be immediately improved by the reduction of the anæmia by transfusion.

Effects of Transfusion on the Administration of Arsenic.—The administration of arsenic after transfusion contributed largely to the subsequent progress of the cases, and there is no doubt, from the history of the cases, that arsenic was often not only more effective but also better tolerated after the transfusion than it was before.

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There is no question as to the comparative value of arsenic and of transfusion as a means of treatment. Arsenic is apparently the most successful and reliable therapeutic agent at present available in pernicious anæmia. Transfusion cannot be regarded as a substitute for arsenic, but it is undoubtedly an adjuvant, which, as my cases show, will sometimes stimulate the bone marrow afresh and lead to a remission, when arsenic cannot be tolerated or has been given without effect.

Effects of Transfusion on the Blood Counts and Films.—Signs of improvement are indicated by the increase in red blood corpuscles and hæmoglobin, as shown by successive counts and by alteration in the character of the films. Following transfusion the white corpuscles are increased in number, and in cases which benefit the leucopænia subsequently becomes less pronounced.

The colour index is immediately lowered by transfusion, and while in some cases it returns to its former high level, in others it gradually decreases as the symptoms improve. In Case XIX., after the first transfusion the colour index was reduced from 1.3 to .98, and remained approximately normal while the patient was improving under treatment. The same patient was re-admitted after a relapse, and on this occasion the colour index was 1.5, but was reduced to 1.4 by transfusion. Two months later, on her leaving hospital again, much improved, with the red corpuscles increased from 900,000 to 3,000,000, the colour index was still high and the symptoms not long afterwards relapsed, the patient dying six months later.

Case VII. also illustrated the modification of the characteristically high colour index following successful treatment and the onset of a remission which was undoubtedly initiated by transfusion. The colour index was 1.3 immediately before transfusion. The blood count taken on the same day after the transfusion was much improved, and the colour index was 1.2. On ten subsequent occasions, during a period of six weeks, the colour index remained below 1.0, but five months later, when the patient was re-admitted suffering from a relapse, the colour index was again high (1.5).

In cases improving under treatment the colour index as a rule became less than it was before, but the diminution was rarely so marked as in the cases quoted above.

The blood films made immediately after transfusion generally present a very different appearance to those made immediately

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before the introduction of fresh blood. Two types of erythrocytes can be recognised, sometimes for several days after transfusion. The normal corpuscles can be readily distinguished by their regular shape and size, and from the uniform way in which they are stained; they form a marked contrast to the patient's corpuscles, which show the variations in size, shape, and staining reaction typical of pernicious anæmia.

Occasionally signs of reaction on the part of the bone marrow appear soon after transfusion. This favourable indication was recognised in Case XVIII. Prior to the transfusion the patient had shown no tendency to react to treatment, and the bone marrow was apparently exhausted. It was noted at the time that few nucleated red cells could be seen, but two hours after transfusion, when the films were again examined, the nucleated red corpuscles were numerous, and one or more normoblasts could be found in every field of the microscope. The patient had been gradually sinking and had been unable to take arsenic. Three days later both the general condition and the blood count were improved, and this occurred before arsenic was resumed. It was probable, therefore, that the appearance of normoblasts in the blood was a sign of fresh stimulation of the bone marrow by the transfusion of blood.

The later changes in the blood films of the cases treated by transfusion varied with the progress of the case. When the symptoms failed to improve, the blood films remained unaltered, but in cases in which a remission followed transfusion the type of cells gradually became more normal, poikilocytosis was less marked, and normoblasts were more frequently observed than megaloblasts.

COMMENTS ON THE RESULTS RECORDED.

It can be definitely stated that, although transfusion may cause a remission of symptoms, it cannot cure a case of pernicious anæmia or alter in any material way the nature of the disease.

Considering the cases as a whole, it can be stated that a definite remission was started by transfusion on fourteen of the twenty-seven occasions (51.8 per cent.) on which it was employed.

In four of the cases which benefited, arsenic was not given until some time after the transfusion, and was then the main factor in the remission which followed.

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On ten of the remaining twenty-three occasions a fresh period of remission was initiated by transfusion when arsenic had previously failed (43·4 per cent.).

Chief stress must be laid on the effects of transfusion in starting a remission when the bone marrow is apparently exhausted and when arsenic has proved useless.

The chances of recovery are greater if the patient is transfused before a critical stage of the illness, and this is brought out by the following figures:—

A. After seven transfusions done as a last resort, when the patients were regarded as hopeless and dying, the transfusion definitely saved life and started a fresh remission in two cases (28·5 per cent.).

B. After sixteen transfusions done, when the patient had failed to benefit by arsenic, and was seriously but not critically ill, there was a fresh remission on eight occasions (50 per cent.).

The results of transfusion will always be uncertain, and it is impossible to foretell whether a case will benefit or not. Acute and toxic cases associated with marked pyrexia are little likely to benefit. The chief advantage of transfusion is that it offers a chance of restoring health to stationary or progressive cases, and even to patients who are otherwise hopeless and in an apparently dying condition. The fact that the longest survival recorded in my series of cases was rallied from an unconscious and critical condition by transfusion, indicates that the question of transfusion should be seriously considered when all other attempts at treatment have failed. It must be granted at the same time that the prospects of benefit for any length of time are not great.

The theoretical grounds for transfusion are less satisfactory in this disease than in the case of primary hæmorrhage or even in secondary anæmia. The etiology of pernicious anæmia is still obscure, and, except in a few cases, it is impossible to detect the source of the toxæmia, which presumably is the cause of the symptoms. The treatment of suspected foci of infection in the mouth and intestinal tract does not seem so far to have influenced greatly the inevitable progress of the disease. Different views are held regarding the explanation of the changes characteristic of pernicious anæmia, and particularly as to whether the bone marrow is primarily or secondarily affected. According to some authorities hæmolysis of the red blood corpuscles is unduly active, and the increase of red marrow is compensatory. Those

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who support the alternative theory regard the marrow as being primarily affected; the active destruction of corpuscles is explained by the formation of immature and fragile cells abnormally susceptible to the hæmolytic activities of the organs concerned with the removal of effete corpuscles.

It is obvious that, if the former theory is correct, the life of transfused corpuscles would be soon ended. My observations prove that a large proportion of the transfused corpuscles is maintained intact for several days after transfusion, and they therefore support the theory that the excessive hæmolysis, which occurs in progressive cases of pernicious anæmia, is due to the impaired quality of the corpuscles formed in the marrow rather than to exalted hæmolytic properties of the serum and organs such as the liver and spleen. There is therefore no contra-indication to transfusion through the belief that the engrafted corpuscles are likely to be rapidly destroyed and functionless.

The method of transfusion is, I believe, of special importance in conditions where the blood is abnormal. No method can give more satisfactory results than direct transfusion from artery to vein, but the advantages of direct transfusion are not sufficiently great to make it preferable to the simpler methods of indirect transfusion, from vein to vein, which entail less sacrifice on the part of the donor. It is not advisable to use citrated blood or sodium phosphate in pernicious anæmia when methods of transfusing unmodified blood are available. A large amount of blood is not required, and the benefit derived is certainly not in proportion to the amount transfused. The dangers of over-transfusion are greater in pernicious anæmia than in cases of recent hæmorrhage where the volume of the blood has been suddenly diminished. The fatty and degenerative changes in the myocardium also limit greatly the degree of strain, associated with an increase of blood pressure, which the heart can withstand. It is convenient, although not necessary, to measure the amount of blood transfused. 500 c.c. of blood can increase the hæmoglobin by 5 or 10 per cent.; and this amount is not likely to cause inconvenience either to the donor or the recipient.

In many of my cases of direct transfusion a much larger amount of blood than 500 c.c. was frequently transfused, as judged by the effects of loss of blood on the donor, and by the great increase in the red blood corpuscles and in the hæmoglobin percentage.

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The question of repeating transfusion may have to be considered, either when a first transfusion has failed to produce the desired improvement or when the symptoms relapse. The repetition of transfusion was certainly successful in two of my cases, and it might quite well be considered more often.

While there is no doubt that transfusion of blood has a favourable influence in certain cases, it is difficult to offer a satisfactory explanation of its therapeutic action. As the duration of transfused corpuscles in the circulation of the recipient seldom exceeds a few days, the advantage of introducing a comparatively small amount of blood is not very obvious. It is, of course, apparent, in cases where the corpuscles are reduced to a minimum, that transfusion of blood might temporarily supply the deficiency and improve oxygenation sufficiently to prolong life for a short time. If transfusion had no other effect than this its advantages would be small indeed. The transfusion of normal blood could hardly be expected to have any specific action on the cause of the anæmia. It has been suggested that fresh serum will dilute or neutralise the toxins in circulation, and it is possible that this may be the case. The only way in which the symptoms of pernicious anæmia can be definitely improved is by the stimulation of the bone marrow, and one of the remarkable features of the disease is the tendency for a remission of the symptoms to occur, either spontaneously or as a result of treatment. Although remissions do occasionally occur, even in apparently hopeless cases, the chances of a spontaneous recovery, when the bone marrow is exhausted, diminish with the lapse of time. The bone marrow must suffer along with the other organs from the effects of prolonged anæmia. The toxæmia affects the bone marrow primarily, but, finally, a vicious circle may ensue, and the persistence of the anæmia may in its turn diminish the natural tendency of the bone marrow to react. There is no doubt that under such circumstances the transfusion of blood does sometimes act as a stimulus to the marrow. Apart from the possible neutralisation of toxin, the most reasonable explanation of the beneficial effects of transfusion is that the bone marrow, sharing in the temporary improvement in the general condition of the patient which immediately follows transfusion, is in a better condition to react than it was before. There was little evidence in my series to show that transfusion by itself was sufficient to cause a continued stimulation of the

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marrow and a progressive reduction of the anæmia without the coincident administration of arsenic. Apart from the cases where transfusion is employed as an emergency procedure, its chief value is that in stationary or progressive cases it may stimulate the marrow in such a way that arsenic again becomes effective, and the patient's health is improved for a variable period till a subsequent relapse occurs.

From the facts observed in the series of twenty-seven cases I feel justified in drawing the following conclusions:—

CONCLUSIONS.

1. Transfusion of blood is of considerable value in cases of pernicious anæmia which have failed to respond to all the usual medical measures. It may alleviate, but cannot cure, such cases.
2. The ideal method of transfusion is either direct from artery to vein or, preferably, indirect transfusion from vein to vein. Anticoagulant substances should not be used when methods of transfusing unmodified blood are available.
3. A large amount of blood is unnecessary, owing to the risks of over-transfusion and to the fact that the benefit conferred by transfusion is not necessarily in proportion to the volume of blood received.
4. A repetition of transfusion should be considered when the symptoms relapse, or if the first transfusion fails to produce the desired effect.
5. The dangers associated with transfusion are small when the modern technique for transfusion is used, and especially if preliminary tests have been made to exclude the risks of hæmolysis.
6. Transfusion is not to be regarded as an alternative to other forms of treatment, but as a therapeutic agent in reserve, available when the usual measures have failed.
7. The benefit resulting from transfusion may be only slight and temporary, or it may be continuous and a fresh period of remission from the anæmia may be initiated.
8. The prospects of benefit are greater if the transfusion is not postponed till the patient is critically ill and in immediate danger of dying.
9. Even in apparently exhausted cases, regarded as hopeless, and whose death appears to be imminent, transfusion

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occasionally will resuscitate the patient in a remarkable manner.

10. Transfusion will initiate a fresh remission in 43.4 per cent. of cases in which the anæmia has been progressive or has failed to respond to medical treatment, including arsenic.
11. When the patients are critically ill at the time of transfusion, having failed to respond to treatment including arsenic, a fresh remission follows in 28.5 per cent. of the cases.
12. When the patients are seriously, but not critically, ill at the time of the transfusion, having failed to respond to treatment including arsenic, a fresh remission follows in 50 per cent. of the cases.
13. The results of transfusion are always uncertain in any given case.
14. Cases of an acute type and cases with marked pyrexia, or a history of hæmorrhages, are least likely to benefit.
15. The immediate effects of transfusion are often striking. Signs of improvement are noted in the colour, mental alertness, pulse, blood pressure, and in the appetite. The patient frequently feels better and stronger.
16. Symptoms of nausea and vomiting are occasionally almost at once relieved and the patient is better able to take nourishment.
17. Arsenic occasionally is better tolerated and frequently is more effective after transfusion.
18. The onset of a remission following transfusion is due to reaction of the bone marrow.
19. Fresh activity on the part of the bone marrow may possibly be due to dilution of toxin or to direct stimulation of the marrow, but is more probably a result of the general improvement in nutrition, following upon transfusion and the more effective exhibition of arsenic.
20. There is little evidence that a single transfusion of blood will continue to stimulate the bone marrow and to diminish the anæmia, unless arsenic is continued.
21. The advisability of transfusion should be considered, but the results are not sufficiently consistent or permanent to justify it being urged, in all cases of pernicious anæmia which are stationary, progressive, or critically ill, in spite of the usual means of treatment.

A PROVISIONAL POINT SCALE FOR THE BLIND.

By W. B. DRUMMOND, M.D., F.R.C.P.E.,
Medical Superintendent, Baldovan Institution.

(Continued from page 247.)

STANDARDISATION OF THE TESTS.

Although I have records of the examination of a group of fifty-two children in Edinburgh, tested by Mr A. J. Lothian, and of a group of eight children in Dundee, tested by myself, I consider it better in the first instance to study the results of the examination of a group of children examined by myself in Manchester. The records of the first two groups will be useful for purposes of comparison, but for the purpose of standardising a scale for the measurement of the intelligence of the blind there are some advantages in confining oneself in the first instance to a group of children who have been living in the same environment, who have been taught by the same teachers, and who were tested by the same examiner under the same conditions. Within a comparatively short period I tested as many as possible of the children in Henshaw's Blind Academy, Old Trafford, Manchester, and I am much indebted to the Superintendent, Mr Illingworth, and to the teachers in the school for the facilities given to me. I began with the lowest class in the school and worked upwards. Owing to want of time I was unable to examine eight children of 14 to 16 years of age in the highest class, and also the children in the backward class. These latter numbered ten, of whom two were considered mentally defective. There remained seventy-six children altogether, but of these three were excluded—one was not presented for examination, being obviously mentally deficient, one was too deaf to be examined, and one, when presented, was in too nervous a condition to do himself justice owing to his having just undergone a medical examination at a hospital. This left seventy-three children all attending the ordinary classes.

Dr Haines' subjects numbered 224, but of these only 142 were blind. The others had sufficient sight to perform the ordinary tests, and were tested by the Yerkes-Bridges Point Scale. Of my own subjects only seven had sufficient sight to perform the regular tests. These were tested with the Point

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Scale for the Blind, and were asked to keep their eyes closed during any tests in which sight would have helped them.

One cannot test a group of blind persons with the Point Scale Tests without being impressed with the fact that those who have been totally blind from infancy are at a great disadvantage, not only as compared with those who retain a useful degree of sight, but as compared with those who, though totally blind, retain visual imagery owing to their having had good sight for some years (five or more?) after birth. This fact is very noticeable in the case of those tests which involve spatial relations, *e.g.*, the adaptation board, and the finger-tapping tests. Consequently the blind may be divided into several groups. To facilitate comparison, I have adopted the same numeration of groups as Dr Haines, viz. :—

1. Totally blind from birth or infancy ;
2. " " five years of age or later ;
3. sufficient vision for the Knox Cube Test, but not sufficient for the regular tests ;
4. sufficient vision for the regular tests (all the tests in the Yerkes-Bridges Point Scale).

It is obvious that there is a gap between groups 2 and 3 unless we suppose the "totally blind" groups to include those who have a very slight degree of vision but not sufficient to perform the Knox Cube Test.

In the tables the chronological age of a subject is taken as his nearest birthday, past or future, at the time of the examination, *e.g.*, children aged 7 years to 7 years 6 months were counted seven-year-olds ; children aged 7 years 7 months to 8 years were counted eight-year-olds.

Table I. gives the Point Scale scores of sixty-six blind subjects of groups 1, 2, and 3. It is constructed on the same lines as Table I. of Dr Haines. It shows the individual score of each subject examined, arranged in chronological age groups, and in the order of the points scored. Although it contains a smaller number of subjects than Dr Haines' table, the number of young subjects is greater. Thus Haines examined only nine subjects under X, while the present table shows the scores of eighteen children under that age. It will be noticed that in spite of the small numbers examined there is a progressive increase from year to year both in the median and in the average scores, with two exceptions in each case. In the case of the averages, there is

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a slight fall at IX and XI. The lowest IX-year score is 34. It was made by a boy aged 8 years 8 months, who had been at school for 8 months, and was in the lowest class. This boy's score is 11 less than that of the next IX, and is lower than that of any of the eight VIII-year children. He may therefore fairly be considered backward or subnormal. If his score is removed, the median for IX becomes 46 instead of 45, and the average 46 instead of 42. The fall at XI is also to be explained by the inclusion in a small group of an inferiorly endowed child. The lowest score here is 26, the next higher being 53. This 26 was scored by a girl of 11 years 6 months, in the lowest class. This child was very small for her age, looking more like a child of 5 or 6 years, than one of 11. She is to be regarded as a case of abnormally retarded physical and mental development. She is not considered feeble-minded, and is therefore an interesting case as indicating that an extremely low mark, giving a very low co-efficient of mental ability (in this case 0.52 if the average is taken as a norm, or 0.45 if the average of the other XI-year cases is taken), is not in itself a proof of feeble-mindedness. In all such cases, the physical condition of the subjects, the personal history, and the previous environment have to be taken into account. If this child is eliminated as abnormal the XI median becomes 58, and the average 57.6.

Thus we find that by eliminating two children who cannot be accepted as normal subjects for their age, neglecting the single XVI-year case, the table comes to show a progressive year-by-year increase both in the median and in the average scores. The lack of uniformity in the yearly progression may be explained in part as due to the small number of subjects examined, in part as due to other factors. The marked rise in my table at XII, and in Haines at XIII, doubtless depends in part on the well-known adolescent acceleration. This occurs earlier in girls than in boys, and it is worth noting that the very high XII-year mark of 93 was scored by a girl—the second youngest pupil in the second highest class in school. The youngest pupil in the class, which included fourteen children, was a boy, and he scored the next highest mark—74.

There is a very steep rise, probably too steep, between VI and VII, and between VII and VIII. The VI-year child who scored 21 had been at school for two months. He was very small for his age, and looked about three years of age or a little more. His score seemed below what one might expect from an

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average child of six. Subsequently a blind child of six and a half years was examined in Dundee. He scored 38. The VII group includes two children who score less than either of these VI-year-olds, and less than half the score of the next lowest VII-year-old. The first of these was an extremely restless nervous little girl. The second, also a girl, was very slow in her responses, and usually replied "I don't know" to questions. Both were quite blind. If these two are removed from the VII group, the median becomes 44 instead of 35.5, and the average 42.2 instead of 32.6. A few other scores are less than 75 per cent. of the average, viz., X, 35; XIV, 44; XV, 48, 48. The first, X, 35, was a boy, aged 10 years 5 months, whom the teacher would have expected to do better. He was one of a class of fourteen children of whom only four were older, while seven were from 1 to 3 years younger. XIV, 44, was a girl, the oldest pupil in the class just mentioned, her age being 13 years 9 months. She had never been at any school till two years before, and during these two years had been absent a good deal from ill-health. XV, 48 is a boy of 14 years 7 months, and the second XV, 48 is a boy of 14 years 8 months. These are the two oldest pupils in a class of seventeen children ranging in age from 10 years 5 months upwards. They are therefore backward educationally. When these various allowances are made, the result is a considerable smoothing out of the curve of progression.

Table II. shows the scores of twenty-seven blind subjects of group 1 (totally blind from infancy), and Table III. shows the scores of the same subjects after removal of those very markedly backward or feeble-minded. The average scores in most of the groups are considerably less than those given in Haines' corresponding table, but Haines has been much more drastic—too drastic, I should say—in his eliminations. For instance, among the few examples he gives of the kind of subject excluded is a girl of XII who scored 58, giving a C.M.A. of 0.83, taking the XII average as the norm. By the Binet Scale she was one and a half years retarded. Haines himself says, moreover, that "it is a grave question to what extent, if any, these subnormals should be eliminated for standardisation of the tests. While there can be no question, as stated above, that this population is loaded above the average with feeble-minded, there is, on the other hand, no doubt that the subnormals who are not definitely feeble-minded should be

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allowed to counterbalance the exceptionally well endowed, in computing averages and medians."

If we take a co-efficient of mental ability of 0.75 as marking off the normal from the mentally defective, *i.e.*, if we regard as defective anyone who scores less than 75 per cent. of the average score for his age, we secure a sufficiently severe elimination. Table I.a has been drawn up to show the changes in Table I. which result from the removal of the subnormal children described above. Pintner's scores given at the foot of the table are the normal scores for sighted children tested with the Yerkes-Bridges Point Scale. These scores are taken from a chart published by Pintner & Toops (*Journ. of Delinquency*, vol. ii., 1917). In the ten age-groups VII to XVI inclusive, the blind children score higher on the average than the sighted children in four years, lower in six years. The medians show an increase from year to year, except that the scores for VII and VIII are the same, and that for XI is one point less than the score for X. The averages also show an increase from year to year with the exception of a slight fall at IX and XI and a considerable fall at XVI. These irregularities may be due simply to the small numbers tested. The XI group includes only three children, and it may be remarked that various observers have noted, when using the Binet tests, that there is very little difference between the intelligence of X and XI-year-old children. Binet and Simon included no tests for the XI-year group in their scale. Only one XVI-year-old pupil was tested, a rather dull individual who scored less than the lowest of the XV-year group.

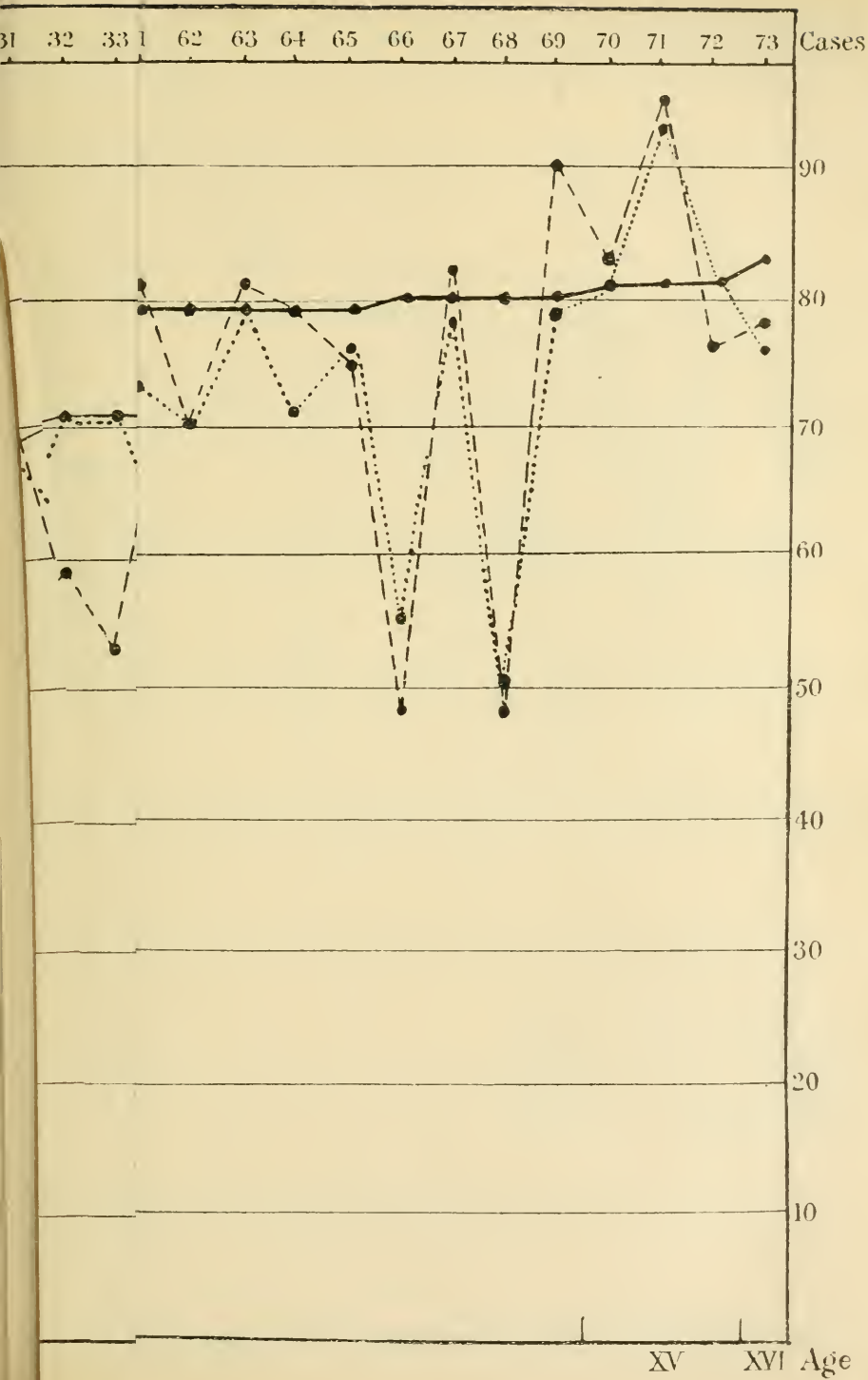
Table III. shows the points scored by the twenty-two subjects of group I who remain after the elimination of the markedly backward and feeble-minded. As in the case of Table II. the points scored are in most cases lower than those given in the corresponding table of Haines. The numbers, however, are too small for generalisation.

The Order of Difficulty of the Tests.—Table IV. shows the average scores of seventy-three blind subjects on the twenty-two tests of the Point Scale for the Blind with the percentage relations of the aggregate scores, on each test, to the possible scores on the same. The tests have been arranged in the order of percentage attainment, and Dr Haines' percentages have been added for the purpose of comparison. The order given differs considerably from that arrived at by Dr Haines.

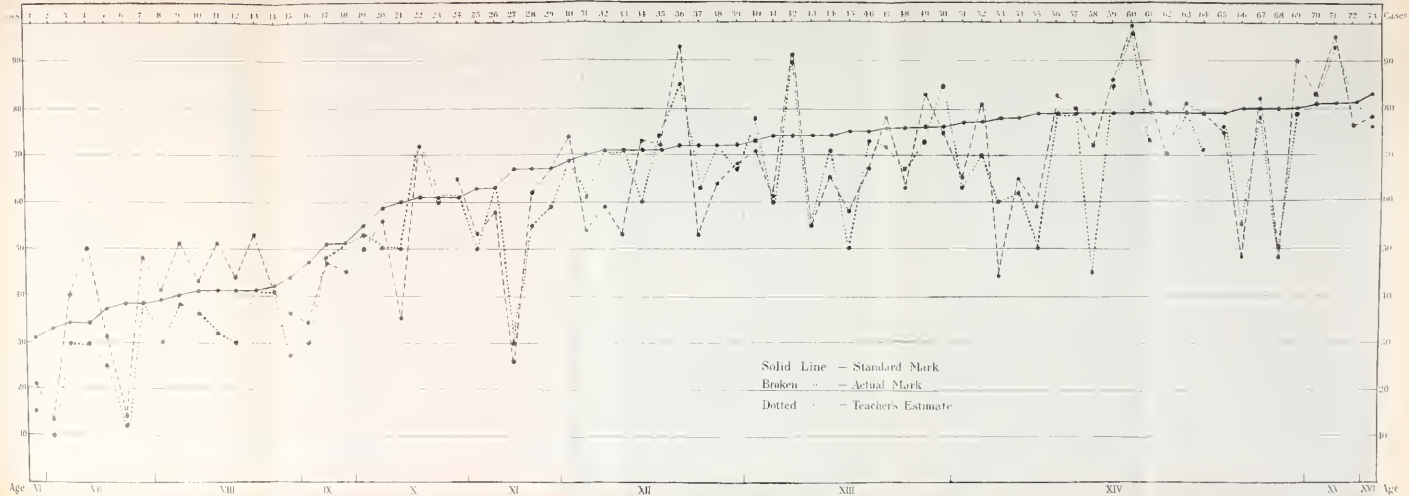
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This difference is easily accounted for. It is due almost entirely to the fact that the subjects tested by me included a much larger proportion of young children. It is evident that two tests which appear to be almost equally difficult, or rather almost equally easy, when put to a series of, say, XV-year-old subjects, may be found to differ considerably if put to children 6 or 7 years of age. Again, there are some tests in the scale of such a nature that no marks can be obtained except by subjects who are approaching the adult level of intelligence, while there are others in which the attainment of full marks involves almost an adult intelligence (within the scope of the test), but which give younger and less intelligent subjects the chance of scoring something. Let us consider, for example, three tests with which Dr Haines' subjects had an almost equal percentage attainment—"Defining abstract terms," 64.3 per cent.; "Finger tapping," 63.6 per cent.; "Sentence making," 62.2 per cent. The corresponding percentage attainments of my own subjects were respectively 28, 55.5, and 51.7. This evidently means that these three tests are not of fairly equal difficulty, as Dr Haines' percentages seem to indicate, but that children are able to make a sentence from three given words and to tap the easier lines of the tapping test a considerable time before they have reached the intellectual level of being able to define abstract terms. My own figures seem to indicate that the second and third tests named do not differ greatly in difficulty. But once more, this apparent equality is apparent only. A series including a still larger proportion of young children would show that children can understand the finger-tapping test and obtain from 25 per cent. to 50 per cent. of the total score two or three years before the average child scores anything with the sentence-making test.

Attempts to arrange the tests in order of difficulty are likely to have different results according to the ages of the subjects examined. The most satisfactory arrangement must be based upon a series which includes a large proportion of young children. An exact arrangement is neither possible nor necessary. It is necessary that every subject examined should be tested with every test which there is any chance of his scoring by. For that reason it is a convenience to have the tests arranged *more or less* in order of difficulty. But in arranging the tests, the order of difficulty is not the only factor to be taken into account. In order to obviate, so far as possible, the



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effects of fatigue, and also the effects of practice, the tests should be so arranged as to avoid bringing similar tests too close together. For example, the "memory span for digits," and the test of "reversing a series of digits" should not be put in juxtaposition. Upon the whole, the arrangement of the tests given in Table IV will be found a suitable and convenient one. It is more in line with the child's development than Dr Haines' arrangement, and has some other advantages in practice. For example, Haines places two of the longest and most fatiguing tests in juxtaposition, viz.: giving as many words as possible in three minutes, and the finger-tapping test. Both tests are interesting alike to the subject and the examiner, but the examiner as well as the subject will find it a relief to separate them by one or two shorter tests. It might be an improvement to place both tests a little earlier in the scale.

Criticism of Certain Tests:—(3) *Repetition of Sentences.*—There is too great a difference between (b) and (c). It is therefore recommended that a test of intermediate difficulty should be introduced as recommended by Yerkes and Bridges in their revised Point Scale. The test sentences (and their scores) will then be as follows:—

Repeat—(a) It rains. I am hungry. (1).

(b) His name is John. It is a very fine day. (1).

(c) The sun is very large and red. Our train was more than two hours late. (2).

(d) It is not necessary to hurt the poor little birds. It is night and all the world rests in sleep. (2).

The total score remains 6.

(6) *Adaptation Board.*—Haines recommends that the board should be placed in four fresh positions. The subject who is successful in locating three positions scores 1. For four positions correctly located the score is 2. The first and second positions are obtained as described on page 5. The third and fourth positions are then obtained as follows:—(3) The examiner now rotates the board so that the large hole moves from lower right to lower left. (4) With similar instructions to the subject, the examiner, with one hand on the upper left-hand corner of the board and one on the lower right-hand corner, rotates the board on its diagonal so that the lower left moves to upper right position.

This test is not a very satisfactory one, and the score

obtained is far from being closely correlated with the intelligence of the child. Children 6 or 7 years of age may be successful, while intelligent children of 12 or 14 may fail partially or completely. In trying the test the examiner must watch very closely what the child is doing. It is an easy thing for a child to keep a finger on the side of the board which is out of the examiner's sight upon the edge of the large hole and thus follow its movements.

I would prefer to replace this test by another which I have described in my paper upon "A Binet Scale for the Blind." This test consists in making a triangle, a square, and a diamond with pieces of stick. It is an interesting and instructive test and the necessary materials are easily procured. It is as follows:—

(a) *The Triangle.*—*Material.*—A flat piece of wood in the form of an equilateral triangle with sides $3\frac{1}{2}$ in. long. Six straight pieces of stick about 6 in. long—*e.g.*, six hexagonal pencils—round pencils being apt to roll out of place. Say to the child, "Take this piece of wood and feel it carefully to find out its shape. Then take some of these sticks and lay them on the table so as to show me the shape of the wood." The child may spend half a minute in examining the wood, but must not be allowed to feel it again after laying it aside. If the sticks are laid so as to form a recognisable triangle, the child is marked (1). The corners need not be absolutely accurate, but should be nearly so.

(b) *The Square.*—This test is similar to the last, but a square piece of wood with sides measuring 4 ins. is used instead of the triangle. This test is slightly more difficult than the triangle but not much. Blind children often attempt to make the form by laying the pencils side by side. When they have put all the pencils in place they seem satisfied.

(c) *The Diamond.*—This test is the same as the last except that the piece of wood used is diamond-shaped instead of square. Its angles measure 30° and 60° . This test is more difficult than the two former.

(7) *Resists Suggestions.*—This is intended as a substitute for Binet XII, 1. It is, however, an unsatisfactory test. The test is supposed to suggest that the cube placed in the right hand will continue to be the larger in trials 4, 5, and 6, as it was in trials 1, 2, and 3. If the subject gives R, R, R, R, R, R, he is said to take the suggestion and scores 0. If he gives R, R, R, L, L, L, or R, R, R, S, S, S (S = same) he is said to resist

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the suggestion and scores 3. So far, so good. But suppose the subject gives R, R, R, R, R, L, or R, R, R, L, R, R, he is in either case supposed to resist the suggestion once and so scores 1. Yet it is evident that these cases are different. A subject who gives L (or S) on the fourth trial has already broken the chain of suggestion at the first opportunity and is thus at a higher level, and so deserves a higher score, than the subject who accepts the suggestion for trials 4 and 5, and only breaks the chain at trial 6. Another weak point in the test is that the subject is exposed to an extraneous source of suggestion in the authority of the examiner. A diffident child who observes that the two blocks *feel* the same may not wish to appear to contradict the examiner by expressing his opinion, or he may even think that one *must* be larger than the other when the examiner demands the big one. In either case he will present one or other block on chance and thus appear to accept or reject the original suggestion when in reality he is doing nothing of the kind. The scoring in this test is found to be very irregular, as would be expected if these criticisms are valid.*

As a substitute for this test, I suggest using one of Binet's tests which has not been utilised for the point scale, namely, the ability to execute three commissions. This is a seven-year test for sighted children, but it is a more difficult test for blind children. It could, of course, be simplified by giving the child three orders which could be executed without his rising from his seat, but it is perhaps preferable to adhere as closely as possible to the original Binet test. Say, "There is a key." Use a large key, and lay it somewhat noisily on the table in front of the child. "Lay it on this chair." Go to a chair three or four paces from the child and move it on the floor so that the child will know its position. "Then go and close the door." Go to the door and open it, making some noise with the handle. "Next take this box which is on a chair beside the door and bring it to me." Move the box on the chair so that the child will hear it. Then sit down again at the table opposite the child and say, "Now, listen again. First put the key on the chair, then close the door, then bring me the box." Do not repeat the directions or give the child any further assistance. Score, two orders executed perfectly (1), three (3).

* It may be noted that Binet's Suggestion Test has been omitted from the Stanford Revision of the Binet Tests, as it is found to correlate very slightly with intelligence.

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(8) *Definitions*.—Substitute “spoon” for “fork.” To children brought up at home, a fork is nearly as familiar as a spoon, but to institution children, the fork may be comparatively unfamiliar. Again, older or more experienced children are apt to say, “What sort of fork do you mean?”

(9) *Aesthetic Test*.—Care must be taken that the differences between the feeling of the articles are pronounced. The serge should be coarse, and for reasons given above a piece of coarse canvas or sacking may advantageously be substituted for the carpet.

(10) *Orientation Test*.—This is a valuable test, but it should be carried out in a room whose orientation is unknown to the child, and the true points of the compass should be used. If a familiar room is used, the child may know, from his geography lessons, the orientation of the room, and the questions become a mere memory test. If an endeavour is made to test the child's intelligence by using hypothetical directions, *e.g.*, facing the child east and saying, “Now, suppose you are looking to the north, where is the west?” it will be found that some children regard the question as an indication either of the examiner's ignorance or of a desire on his part to lead them astray. They *know* that the window faces west, and so they point to the window. No doubt this indicates some lack of constructive imagination on their part which deserves to be penalised. Probably the best method of carrying out the test would be to take the subject into an unfamiliar room, to blind-fold him if he can see light, and to turn him round several times so that he may lose his bearings. Without these precautions the test can scarcely be quite comparable in different subjects.

(13) *Finger Tapping*.—The Knox lines H, I, J, should be retained, scoring one each. Total score (3). To make up for this addition of three marks, Haines suggests the deduction of three marks as follows:—Test 1, naming objects, seven named out of eight to score (1). Test 2, illusion, to score (1). Test 10 (a), to show examiner's right hand, to score (1). To this, I agree.

(16) *Comprehension*.—These questions are arranged in the order of increasing difficulty.

(19) *Absurdities*.—Pintner finds the “three brothers” more difficult than “the unlucky cyclist,” and uses substitutes for the more gruesome of the Binet set. In the case of the blind children examined by me, the order of difficulty was as follows:

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(a) three brothers, (b) eighteen pieces, (c) unlucky cyclist, (d) last car, (e) suicide. The gruesomeness of some of the incidents did not seem to have any emotional effect upon the children except, in a few cases, to cause laughter.

(20) *Definitions of Abstract Terms*.—Pintner states that he expected to find the proper order to be: obedience, justice, charity, but that he found the correct order to be charity, obedience, justice. According to my own observations, the correct order is: obedience, charity, justice, the first of these being much the easiest, while there is little difference between the second and third. The discrepancy appears to support the idea that obedience is a virtue which is impressed upon American children comparatively lightly.

Revised Order of Tests with Alterations in Scores:—Table IV shows the percentage attainment in each of the tests. Reasons have been given above for substituting other tests for the Adaptation Board and the Suggestion test, for slight alterations in two or three other tests, and for changes in some of the scores. When these alterations are made, the tests will be arranged as indicated in Table IV., with the exceptions that a stick-laying test is substituted for Test 9 (Adaptation Board), and a modification of Binet's triple commission test for Test 7 (Resisting Suggestions). All the changes suggested, along with the revised scores, are shown in Table V., which is the revised Point Scale Record for the Blind.

Point Scale Scores compared with Teachers' Estimates:—Teachers' estimates of the ability of their pupils are known to be not infrequently curiously unreliable. Teachers of optimistic temperament have reported 70 per cent. of their pupils to be "bright" above the average, while the pessimistic teacher may regard the majority of scholars as stupid to a degree. Other factors besides the teacher's temperament are liable to confound the judgment. The attentive, short-sighted child with spectacles often looks wiser than he is, and is taken at his face value, while the hypermetropic pupil whose attention is quickly fatigued is liable to be regarded as less intelligent than he really is. Again, a child who is physically and mentally above the average for his age may be placed in a class of older children, where he takes no conspicuous place and is consequently regarded as mediocre by the teacher, while a backward child in a class of younger children may easily be taken by the teacher to be of average or more than average ability.

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Though quite awake to such sources of errant judgment, I have yet thought it worth while to obtain the teachers' opinions of the children I examined in Manchester for the purpose of comparison with the results of the investigation. For this purpose I prepared a list of the children, giving the name of each with the age in years and months, and the standard point scale score for that age for sighted children (according to Pintner, *supra*). The headmistress, Miss Wigg, kindly undertook to consider each child in consultation with the class teacher, and to assign a mark indicative of the intelligence of the child. If the child was regarded as being of average ability he was to receive the standard mark. If he was considered above or below the average he was to be awarded a mark above or below the standard. Thus if a clever child of 12 was supposed to have the intelligence of an average child of 13 or of $13\frac{1}{2}$ years of age, he was to be given the standard mark for the proper higher age.

Haines compares the scores of the blind and seeing by taking the scores of the blind on tests common to both scales (which give 72 possible marks) and raising them to a percentage basis, and comparing them with the total Yerkes-Bridges score of seeing children. The results indicate that the Point Scale is a reliable measure, and that the intelligence of the blind is not markedly inferior to or different in quality from that of seeing subjects.

Assuming the last statement to be correct, we may take the marks assigned by the teachers as an indication of the mental ability of the children to indicate also the mark which the teacher would expect each child to gain if tested with the Point Scale for sighted children. What we wish to discover is whether there is any correlation between these marks and the marks actually gained upon a scale designed for the blind in which 8 tests out of 22 are substitutes for tests in the original scale which are unsuitable for blind subjects. The results show a much closer correlation than (in my opinion) one had any right to expect. This is obvious when a graph is made showing the standard marks, and the teacher's estimates and the actual scores in each case. Such a graph shows that out of the whole 73 cases there are only 16 instances in which the teacher's mark is on the opposite side of the standard from the actual mark. Of these 16 instances, no less than 7 occur among the first 13 children examined. These were the youngest children

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in the school. That is to say they were, for the most part, children who had not had time to get much benefit from the school instruction, and whom the teachers had not had time to become acquainted with. It is noteworthy, that in all the 7 cases referred to, the teacher's estimate was below the standard, while the actual mark gained was above it. This may be explained either on the supposition that the Point Scale (like the Binet Scale) is too easy at the lower end, or that teachers are apt to underestimate the intelligence of little children new to school life. The latter supposition is the more probable, as the standard mark is based upon the actual mark gained by young children.

In the case of the older children, however, the tendency of the teacher is still to underestimate, rather than to overestimate, the capability of the child. There are only two cases in which the teacher has given a child a mark above the standard where the actual mark gained is below.

We thus find that a discrepancy exists as to the position of children above or below the standard in 50 per cent. among 13 of the youngest children, while among the remaining 60 children a similar discrepancy is found in only 15 per cent. of cases. In none of these 60 cases is the discrepancy very great. In the three cases showing the greatest difference, the teacher's estimate, the standard mark, and the actual mark gained are as follows: 73, 76, 83; 70, 77, 81; 79, 80, 90. In all other cases the teacher's estimate and the actual mark approximate very closely to the standard mark.

Among the first 13 cases referred to above, there were 6 cases in which the teacher's estimate differed from the actual mark gained by more than 10, while in the remaining 60 cases the same discrepancy was found in only 6 cases, thus exemplifying again the comparative difficulty of estimating the intelligence of young children. In over one-third of the 60 cases (*i.e.* in 21) the difference between the teacher's estimate and the actual mark gained was not more than 2 marks—a remarkable degree of approximation.

These results seem quite sufficient to establish the fact that the Point Scale for the Blind, though not perfect, is a useful and reliable instrument for gauging the intelligence of young blind subjects.

Edinburgh Blind Children.—Mr Lothian has sent me notes of 52 children whom he tested with the Point Scale at the

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school of the Royal Blind Asylum at West Craigmillar, Edinburgh. Mr Lothian says his results "are close to the American figures and fit the teachers' estimates of intelligence in 75 per cent. of the cases at least."

An examination of the figures supplied shows that the mark indicating the teacher's estimate of the child's intelligence is on the opposite side of the standard mark from the mark actually gained in the examination in only 5 cases out of the 52. In all these cases the teacher's mark is below the standard and the mark actually gained is above. This shows that the Edinburgh teachers have the same tendency as the Manchester teachers to take a low rather than an exaggerated view of their pupils' intelligence.

The statement just made may seem to imply a closer correlation between the teachers' estimates and the marks gained in the case of Edinburgh than in the case of Manchester. The opposite, however, is the case, owing to the fact that the Edinburgh teachers display a very strong tendency to regard their pupils as just normal, and to give them the standard mark for their age. The standard mark has been assigned to no less than 19 children out of 52, whereas in Manchester the standard mark was given to only 15 out of 73. This tendency was much more marked in the case of the younger than of the older pupils. The standard mark was given by the Edinburgh teachers to 16 of the 26 younger children, and to 3 of the 26 older ones. This seems to indicate a much greater unwillingness on the part of the teachers to commit themselves as to a child being above or below the average in the case of children who have mostly been at school for a comparatively short time than in the case of those who have been at school longer, and with whom they are presumably better acquainted.

Another point of interest in the Edinburgh figures is the number of cases in which there is a considerable discrepancy between the teachers' estimate and the mark gained. These two marks differ by more than 10 in no less than 20 cases out of 52 (Manchester, 16 cases out of 73); by 15 or more in 10 cases (Manchester, 6 cases); and by 20 or more in 5 cases (Manchester, 2 cases). Such great divergences require some explanation, but that explanation can be obtained only by special investigation of the individual cases. In some cases it might be found that a child had been ill or specially nervous or in some other way unfit to do himself justice at the time of the

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examination. There might even be fraud or a foolish attempt at a practical joke on the part of the child. Failing such explanations, and assuming (as we have reason to do) that the scale is reliable, any great discrepancy would indicate either a mistake on the part of the examiner or an error of judgment on the part of the teacher. In deciding the case, the Binet Scale for the Blind should be of assistance.

TABLE I.

*Points scored by 66 Blind Subjects of Groups 1, 2, and 3,
arranged in Age Groups.*

	Ages.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.
Scores	.	21	13	36	34	35	26	53	53	44	48	78
"	14	41	45	50	53	54	55	59	48	...
"	31	41	47	56	58	59	58	63	82	...
"	40	43	...	60	62	72	61	65	83	...
"	48	44	...	65	...	74	64	65	90	...
"	50	51	...	72	...	93	68	70	95	...
"	51	...	...	...	...	71	72	...	...
"	53	...	...	...	...	78	75	...	...
"	83	75	...	...
"	94	79	...	...
"	80	...	...
"	81	...	...
"	81	...	...
"	85	...	...
"	97	...	...
Medians	.	21	35.5	43.5	45	58	55.5	65.5	66	75	82.5	78
Av. Dev.	13.3	4.7	4.3	9.3	10.2	12.1	10.3	9.3	15	...
Averages	.	21	32.6	45	42	56.3	49.7	67.5	68.5	72.6	74.3	78
Haines' Av.	44	45.3	36	56.6	61.2	64.4	73.3	78	82.5	79.9

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TABLE IA.

Points scored by 56 Blind Subjects of Groups 1, 2, and 3 after excluding as subnormal 10 of the 66 Subjects of Table I.

Ages.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.
Scores . . .	31	41	45	50	53	53	53	53	59	82	78
" . . .	40	41	47	56	58	54	55	63	83	...	...
" . . .	48	43	...	60	62	59	58	65	90	...	...
" . . .	50	44	...	65	...	72	61	65	95	...	...
" . . .	...	51	...	72	...	74	64	70	...	...	...
" . . .	...	51	...	...	...	93	68	72	...	...	...
" . . .	...	53	...	...	...	...	71	75	...	...	...
" . . .	...	...	...	...	...	...	78	75	...	...	...
" . . .	...	...	...	...	...	...	83	79	...	...	...
" . . .	...	...	...	...	...	...	94	80	...	...	...
" . . .	...	...	...	...	...	...	...	81	...	...	...
" . . .	...	...	...	...	...	...	...	81	...	...	...
" . . .	...	...	...	...	...	...	...	85	...	...	...
" . . .	...	...	...	...	...	...	...	97	...	...	...
Medians . . .	44	44	46	60	58	65.5	66	75	86.5	78	...
Av. Dev. . .	6.7	4.2	1	6.2	3	12.1	10.3	7.2	5	...	...
Averages . .	42.2	46.2	46	60.6	57.6	67.5	68.5	74.7	87.5	78	...
Pintner's Yerkes-Bridges Scores	28	35	41	51	58	64	70	74	79	81	84

TABLE II.

Points scored by 27 Blind Subjects of Group 1 (i.e. totally blind from infancy).

Ages.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.
Scores . . .	21	13	41	...	50	53	59	53	44	48	...
" . . .	...	14	43	...	65	58	...	71	59	...	...
" . . .	...	31	51	...	...	62	...	83	63	...	...
" . . .	...	48	53	...	...	...	...	...	70	...	...
" . . .	...	50	...	...	...	...	...	...	72	...	...
" . . .	...	...	...	...	...	...	...	...	75	...	...
" . . .	...	...	...	...	...	...	...	...	81	...	...
" . . .	...	...	...	...	...	...	...	...	97	...	...
Medians . . .	21	31	47	...	57.5	58	59	71	71	48	...
Av. Dev.	14.2	5	...	7.5	3	...	10	11.8
Averages . .	21	31.2	47	...	57.5	57.6	59	69	70.1	48	...

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TABLE III.

Points scored by 23 Blind Subjects of Group 1, after elimination of the markedly backward and feeble-minded.

Scores	Ages.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.
	31	41	...	50	53	59	53	59	...
"	48	43	...	65	58	...	71	63	...
"	50	51	...	...	62	...	83	70	...
"	53	...	...	...	...	...	72	...
"	75	...
"	81	...
"	97	...
Medians.	48	47	...	57.5	58	59	71	72	...
Av. Dev.	6.3	5	...	7.5	3	...	10	7.2	...
Averages	43	47	...	57.5	57.6	59	69	73.8	...

TABLE IV.

Average scores of 73 Blind Subjects on 22 tests of the Point Scale for the Blind, with the percentage relations of the aggregate scores, on each test, to the possible scores on the same.

Original No.	Designation of Test.	New No.	Possible Score.	Average Score.	Percentage Attainment.	Dr Haines' Percentage.
1	Naming Eight Objects .	1	2	1.95	97.9	94.2
2	Size-Weight Illusion .	2	2	1.91	95.8	94.9
12	Differences between Common Objects . .	3	6	5.58	93.1	91.6
5	Comparison of Sticks and Weights . . .	4	3	2.78	92.6	99.1
9	Choosing the "Nicer Feeling" . . .	5	3	2.73	91.3	99.1
14	Counting Backwards (20 to 1) . . .	6	2	1.72	87.6	93.6
7	Resisting Suggestions .	7	3	2.49	83.1	86.6
8	Defining Chair, Horse, etc.	8	8	6.63	82.8	93.9
6	Adaptation Board . .	9	2	1.57	78.7	83.9
4	Memory for Digits . .	10	6	4.1	68.4	81.8
18	Arranging Weights . .	11	2	1.31	65.7	83.9
11	Giving Words in Three Minutes . . .	12	4	2.60	65.0	72.1
3	Repeating Sentences .	13	6	3.90	65.0	80.3
13	Finger Tapping . .	14	8	4.45	55.5	63.6
15	Reversing Series of Digits	15	4	2.17	54.4	73.1
17	Sentence making . .	16	4	2.06	51.7	62.2
16	Comprehension . .	17	8	4.12	51.5	70.4
19	Absurdities . . .	18	5	2.20	44.1	62.1
10	Orientation . . .	19	4	1.36	34.2	80.0
22	Disarranged Sentences .	20	6	1.89	31.5	56.4
21	Analogies . . .	21	6	1.71	28.5	53.2
20	Defining Abstract Terms .	22	6	1.68	28.0	64.3

OSTEITIS FIBROSA.

By DAVID M. GREIG, C.M., F.R.C.S. Edin.

FROM the comparatively scanty literature of this somewhat rare disease, there is apparent an uncertainty as to the significance of an initial traumatism, as a factor in the production of the condition. In some cases no history of injury has been obtained, but in most there is such a history, though sometimes vague, and the association between the degeneration and the traumatism seems fairly evident. Though overgrowth is a characteristic, I use the term "degeneration" because the main function of the bone, namely its rigidity, is more or less in abeyance.

It is obvious that were traumatism the only etiological factor, the condition would be far more common than it is, and by the admission that there is something besides injury requisite for the production of osteitis fibrosa, one allows the inclusion of such cases as yield no history of injury or of only a slight and trivial accident.

Of the two cases I now report, the first is particularly interesting, in that a fracture of the femur in childhood healed well and was followed by no untoward circumstance, whereas a fracture of the leg seven years later was followed by an osteitis fibrosa of the tibia, and a fracture of the same femur shortly afterwards was followed by a similar affection of that bone. Such an extraordinary occurrence points surely to some constitutional peculiarity of the bones or of the osteoblasts, so that the fresh deposition of healthy bone is interfered with. The second case, too, is interesting in that the affection of the tibia was not preceded by a fracture but was apparently the result of over-exertion by a soldier in the retreat from Mons during the early stages of the Great War.

CASE I.—The patient's family history was a good one. She was the youngest of six, who, with their parents were well and strong. Before going to school she had double otitis media and the otorrhœa had recurred intermittently thereafter. When 7 years old she fell while playing and broke her right thigh "about the middle." This was treated with extension and local splints and she made a good recovery after six weeks in bed. Neither deformity nor disability was noticed. At 15 years of age she tripped over some branches in a wood and fell, breaking her right leg "below the middle." Splints



FIG. I.—OSTEITIS FIBROSA, CASE I.
Showing comparison between affected and healthy limb.

Osteitis Fibrosa

were applied and she was again confined to bed during six weeks. She was only up one day when she slipped on the floor and fell and fractured her right femur "near the upper end." Splints were reapplied and she was again six weeks in bed, and it was some time after that before she was able to put any weight on the limb. Then she noticed that gradually both femur and leg became bent. The femur assumed a curvature with its convexity outwards. The trochanter major was displaced upwards, and when the curvature had reached its maximum a straight line drawn from the anterior superior iliac spine to the upper edge of the patella was two inches shorter on the affected side than on the normal left limb.

At the same time an increasing curvature took place in the leg so that the tibia was bent forwards and also a little outwards.

When I saw her she was 19 years of age, rather a white-faced delicate-looking young woman, but apart from the condition of her right lower limb and her otorrhœa she was apparently in good health. There was no menstrual irregularity. Her gait simulated a congenital dislocation of the hip, the limb became easily tired, and she complained of pain about the knee and up the thigh. A radiogram (Fig. 1) showed that both tibia and fibula were affected, though the former much more so than the latter. There was want of density of the osseous tissue and apparently a tendency to vacuolation or the so-called "cystic" formation.

I did a cuneiform osteotomy of the tibia to correct the double deformity of that bone, and the section removed showed equal cancellous tissue throughout. There was no proper distinction of compact tissue, the surface of the tibia was rough, and there was no obvious medullary cavity. The operation was followed by great improvement, and when the leg bones had healed I did a subperiosteal osteotomy of the femur at its upper third and put the limb up in abduction. The bones united well and the result was very satisfactory.

I heard from her ten years later when she was working on a farm in Canada. The physical work was very hard, she wrote, and at times she felt the limb painful, but no return of the deformity had taken place and on the whole she had little to complain of.

CASE II.—Male, aged 38. His family history appeared to be good and his personal health had been unexceptionable as he had never had a day's illness in his life except in relation to the trouble in his left leg. After two trainings in the Perthshire Artillery Militia he enlisted in 1903 in the Seaforth Highlanders. He served during eighteen months at home and then proceeded to India, where he served during two years at Nasirabad; he had no illness nor any complaint during that time. He then passed automatically into the Army Reserve and worked as a

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miner in the Fife mines until recalled to the colours in 1914, when he was posted to the 2nd Seaforth Highlanders.

He married in 1908 and has three children, well and healthy.

This history is important, because being in the regular army before the War, and in the Seaforth Highlanders at that, no further proof is required that he had neither varicose veins nor bent tibia. There is no reason to disbelieve the man's account of his previous health, and though the present condition of his tibia suggested a syphilitic origin, his personal history, the health of his children, and the fact that on three occasions his Wassermann reaction has been definitely negative entirely disprove the presence of a syphilitic taint.

He took part in the retreat from Mons, and though wounded at Soissons by shrapnel the wounds were all superficial and did not put him off duty, and it is certain that no bone was injured. On more than one occasion he was knocked over by a bursting shell and once hurt himself by falling into a shell-hole, but he was at no time aware of any direct injury to his left leg.

When the stress of that particular marching and fighting was over he became aware of pain in the left leg which was worse at night, and he noticed that there was a varicose condition of the veins of the left leg and thigh which he had not had before. He not unnaturally considered that the pains in the leg were due to the varicose veins, but presently it was obvious to him that the left tibia was becoming bent forwards, and this continued till the condition shown in the photograph was reached (Fig. 2).

Gradually, with very prolonged rest, the pains in the limb have diminished, while the varicose veins have remained the same, but there has been no alteration in the forward bending of the tibia.

Here is a condition perhaps previously unrecognised. The appearance at once suggested a periostitis with hypertrophy of the bone, but no such explanation could account for the bending of the shaft. On examining the affected parts and after seeing the radiogram (Fig. 3) one is not surprised that Board after Board on this soldier, and medical practitioner after medical practitioner, considered the condition a syphilitic one. But syphilitic curvature of the tibia is certainly generally bilateral, and there can be no question now of the freedom from syphilis in the patient under consideration.

The relation of the varicose veins to the prolonged strenuous exertion which this man was subjected to, is only what is so often found in athletes, in whom training has been too severe. Probably in this case the left leg gave way because it was anatomically and functionally the weaker of the two, the limb



FIG. II.—OSTEITIS FIBROSA, CASE II.
Showing deformity.



FIG. III.—RADIOGRAM OF CASE II.
Showing tibial curve.

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in which the continuous muscular strain would be the more severely felt. In this perhaps may be found some explanation of the osseous changes which followed hard upon the varicosity. Is it not possible that the very circulatory disturbances which brought about the varicose condition of the superficial veins from the calf to the groin, might not at the same time have produced altered nutritional conditions within the bone itself, and so affected the vitality of the osteoblasts as to bring about some abrogation of their function? Is this disease, osteitis fibrosa, not in reality an osteoblastic dysplasia, a dysplasia aggravated, it may be, by traumatism but dependent on general as well as local conditions?

Whatever view be held of the function of the periosteum as a bone-generating membrane, it is certain that osteitis fibrosa is essentially a medullary and not a periosteal affection. Doubtless it may be aggravated by any malnutrition. Deficient food, anæmia, rickets, unsatisfactory environment, may each play its part as an etiological factor or a predisposing cause. In the first of my two patients it is even possible that pubertal conditions influenced the production of osteitis fibrosa, for it is not without significance that an early fracture at the age of 7 healed without any unusual happening, while at the age of 15 two fractures were followed by osteitis fibrosa. Such a possibility seems to link osteitis fibrosa, a local disease, with that generalised softening of the bones found in osteomalacia, a generalised softening, apparently in some cases at any rate, in association with functional activity of the organs of generation in the female.

VACCINE THERAPY IN GYNECOLOGY AND OBSTETRICS.*

By ROBERT ROBERTSON, M.B., C.M., B.Sc.

I HAVE ventured to put a few cases together with a view to showing what an immense aid a correct bacteriological examination or a knowledge of the commoner organisms associated with uterine disease may be in the course of practice. While, of course, an autogenous vaccine is always to be preferred, in many cases the material for its preparation is difficult to obtain, or it may be too expensive for the patient. Very often a good stock vaccine can be used with advantage, but to do so with success a proper diagnosis and a knowledge of the bacterial causes of disease is essential. For instance, in gonorrhœa it is very seldom that you get a pure infection of gonococcus; it is usually combined with streptococcus and staphylococcus, besides other organisms. Of the cases noted in this paper, some were treated with autogenous and some with stock vaccines.

CASE I.—The first case is that of an unmarried woman who gave a history of menorrhagia and frequency of micturition, complained of being always tired and was just beginning to recover when the hæmorrhage recurred. Her life was very miserable as she was unable to go any place on account of her irritable bladder condition. She had been twice operated on before, and, as far as I could gather, one of the operations at least had been a curettage. On local examination her uterus was enlarged, in normal position, and the os admitted the tip of the finger. There was a good deal of white discharge. She was put under chloroform, a catheter sample of her urine obtained and the uterus was curetted. In the urine, which was submitted to Dr Ford Robertson, an anaerobic diphtheroid was found. Inoculations were begun on 23rd October 1918. After her second inoculation there was a great increase in the frequency of micturition for two days, and for a day and a night she had very severe uterine hæmorrhage. After waiting a reasonable period, another vaccine was given, and there was a slight recurrence. After that there was no further hæmorrhage and the first sign of improvement was that she could lie all night without passing urine. It was still troublesome during the day. She gradually went on improving and the vaccine was continued until the

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13th of June 1919. Her menstruation was then quite normal and she was quite well as regards her urine. She is now married and is four months pregnant.

CASE II.—The second case is one of frequency of micturition in a woman about 45 years of age. The history, as is usual in these cases, was very difficult to get. What she complained of was a great feeling of coldness. She was laden with clothes and even then could not keep herself warm. On local examination, a uterine fibroid was found, and I asked Dr Haig Ferguson to see her. He said that the fibroid was small, on the anterior surface of the uterus, and that the pressure on the bladder probably accounted for her distressing urinary symptoms. He thought she would not require operation and that with medical measures she would recover. These were persevered with for some time, but there was no improvement on her condition. I then submitted a catheter sample of her urine to Dr Ford Robertson. *Bacillus coli* was found. A vaccine was prepared, and after a prolonged course of treatment she could keep her urine for six or seven hours, had not to get up during the night, and the feeling of intense coldness had passed away so that she was able to go about with a normal amount of clothes, and for two years has remained very well.

Both these cases illustrate the fact that any such course of treatment must be very long, and especially with a chronic affection of *bacillus coli* it is almost impossible to get a complete recovery. A great improvement will take place, but once the causal organism is known, a good stock vaccine can be used with advantage.

I have seen two cases of rheumatoid arthritis recently where the uterus was the septic focus.

CASE III.—Mrs W. was troubled with frequency of micturition, pain in the back, and leucorrhœa. On examination, the uterus was large and tender, and the os admitted the tip of the finger. She was given a few stock rheumatoid arthritis vaccines along with *bacillus coli* and then curetted. Her vaccines were persevered with. There was very considerable improvement in her rheumatism. She could use her hands more freely, could walk a great deal better, the leucorrhœa had stopped and the pain in her back was gone. In this case stock vaccines were persevered with because they gave characteristic reactions, and the question of expense prevented a full bacteriological examination. She has now gone to London, where her vaccine treatment will be continued.

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CASE IV.—The next case is a very interesting one of a lady, Miss F., who came from America where she had contracted rheumatoid arthritis. She had gone through all the routine treatment in America and had not derived any benefit. The condition, when I saw her, had lasted about a year and a half. She had come to this country to try to get cured, and was having electric treatment when she came to see me. A swab was taken from the anterior and posterior nares, and the urine and stools were examined by Dr Ford Robertson. The usual organism found in such cases, however, could not be isolated. He suggested some of the menstrual blood for examination. On account of her age and irregularity in this respect, that could not be obtained, and it was decided to get a uterine swab. On pulling down the uterus there was an excessive amount of white creamy pus coming from the os, and, showing that the irritation had been there for a considerable time, a small polypus was growing from the cervical canal. This patient, on being asked, had always denied that there was any excessive discharge. An anaerobic diphtheroid was recovered from the uterus. The vaccines prepared from the other sources had not produced any characteristic reaction, but with the uterine diphtheroid there was a very marked reaction of pain. The reactions gave pain in parts of the body where she had not had pain for months before. In this case the patient is still under treatment, but there is no doubt about the improvement in the rheumatoid condition. She can walk up and down stairs in an ordinary way, whereas before she could only go down backwards, one foot at a time.

CASE V.—*Bacillus coli* as diagnostic.—Mrs R. had an attack of cystitis before delivery, passing blood in the urine. Her recovery after delivery was not satisfactory. She was always tired, had pain in the back and down-bearing; very frequent micturition, to which she paid very little attention as the water was always clear; there was nothing to be made out on local examination. *Bacillus coli* was used as a diagnostic. She has had five inoculations. The down-bearing is gone, she retains the urine for a reasonable time, and there is a great improvement in her colour and facial expression.

CASE VI.—Mrs B., aged 47 years, had a high temperature with rigors, pus in the urine and distended abdomen. This patient was very ill, with a cadaverous dying look in her face. Locally the uterus was enlarged with a swelling in the right broad ligament. The urine was fetid and laden with pus. The point to decide was whether the bladder condition or the pelvic condition was responsible for her illness. Dr Haig Ferguson saw this case with me and thought she was too ill to have any operation done. A nearly pure growth of *bacillus coli* was got in the urine. With vaccines the urine very

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quickly cleared up, the rigors disappeared, and, after a fairly long illness, she made a satisfactory recovery and the swelling in the ligament has given no more trouble.

There is a point here about a bacillus coli infection. After a case has acquired a certain chronicity of infection, it seems to be impossible to eradicate bacillus coli, but the patient can be kept in perfectly good health by regular immunisation. In the case under consideration she is kept in good health by an injection once a month or six weeks. The immunity in this case can be got by the use of stock vaccine.

I have treated a number of cases of chorea on the understanding that chorea is an irritation, probably of meningitic nature, irritating the nerves, and rheumatic in its origin. These cases, mostly in young people, have all done exceedingly well, and I have treated a considerable number of them. I came across a case of chorea in pregnancy in a poor woman and the condition was certainly very bad. She was treated with three stock vaccines. However, her mother got tired of nursing her and asked me to send her into the Maternity Hospital, which I did, although I told the mother that she was a great deal better and would probably come all right. Dr Haig Ferguson met me on the street a few days afterwards and said that he had received this case, and did not think there was much wrong with her. I think she was only kept a week or ten days in the hospital, when she was sent out. There was no return of the chorea, and she was delivered with no further recurrence. She has had a second child, with no return of the chorea.

I show you a chart of a puerperal septicæmia, in which on the third day after the confinement the temperature rose as is shown in the chart. A staphylococcus and streptococcus vaccine was at once given. The next day the uterus was swabbed out with 1 in 5 carbolic acid. The swab was reported to contain staphylococcus and streptococcus. The temperature gradually began to fall two days afterwards and the woman made an uninterrupted recovery. It may be said that this result was due to the swabbing out of the uterus, but the probability is that this case was saved a pretty prolonged and dangerous illness by having her resistance toned up against the staphylococcus and streptococcus which were found in the uterine swab. There are charts in the writer's possession of pneumonia cases where one frequently gets the same happy results. I think if a

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sufficient number of cases were collected they would go to prove that this is an advance on the usual routine treatment.

Another point of importance here is the very early use of the vaccine before there was a great circulation of toxins in the blood. I had also a case of an out-lying portion of the placenta being retained in the uterus. The patient seemed to get on well except for a very rapid pulse; no temperature. I suspected some septic process, and gave a staphylococcus and streptococcus vaccine and was very disappointed that the pulse-rate did not come down. I therefore decided to explore the uterus, and found this small piece of placental tissue lying there. Immediately after its removal the pulse fell, but I believe in this case, had it not been for the use of the vaccine, we would have had a typical septicaemia case. This illustrates the limitation of a vaccine. Unless the septic focus can be got at, and either removed or free drainage provided, a vaccine is not likely to be beneficial.

I have had some interesting cases of phlebitis treated with bacillus coli, and the results are sufficiently striking to justify this agent being employed in all cases. I think, from my experience, that a fair amount of amelioration may be expected in a large proportion of the cases, and a much greater rapidity of recovery can be pretty confidently looked for. If it is used sufficiently early you will prevent excessive clotting in the vein, and a readier absorption of the clot with a quicker return of the circulation. I have not had an opportunity of trying this in a case of "white-leg" coming on acutely after a confinement, as I have not had such a case since using this vaccine for the purpose. In regard to this particular question, it is usually looked upon as a sign of sepsis when it occurs after a confinement, and I have heard medical men suggest that the doctor is responsible for the condition. I had one interesting case in which the phlebitis came on first, where the patient was very ill and where the abortion took place during the course of the very severe illness which resulted from the phlebitis. In this case some stock bacillus coli vaccines were used, and may have helped her recovery, but I had not enough experience then to give me the necessary courage to persevere with them. It is an interesting commentary on "white-leg" following confinement, and since that case I have been of opinion that the condition of the leg is dependent upon a lowered resistance to the bacillus coli already invading the blood.

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From my consideration of the cases reported here and many other cases treated by the writer by vaccine therapy, it seems that a closer co-operation between the physician and the bacteriologist is necessary. The practice of medicine is becoming such a complex business that no one man is capable of dealing with the cases unaided, and it seems to me to be a pity that in Edinburgh there is not a greater amount of team work undertaken, whereby a closer co-operation would take place with the physician, the surgeon, the bacteriologist, and the radiologist.

CRITICAL REVIEW

TYPES OF TACHYCARDIA AND IRRITABLE HEART.

By ALEXANDER GOODALL, M.D., F.R.C.P.

SINCE the war began the practitioner has had to deal with cases of cardiac disturbance which, in many instances, have presented new and difficult problems. The most common has been the "irritable heart" of soldiers, often labelled "D.A.H." or "Effort Syndrome." Influenza was followed by many instances of breathlessness, weakness, tachycardia, and unfitness, which appear to have had different explanations, including severe, and in some cases, permanent myocarditis. Pneumonia, malaria, and other infectious diseases often left symptoms in their train referable to cardiac conditions. The number of published papers dealing with such cases now numbers several hundreds, and the accumulation of experience has given considerable value to the more recent.

During the nineteen months which elapsed between the entrance of the United States into the war and the signing of the Armistice, approximately 4,000,000 soldiers were subjected to a special physical examination of their circulatory apparatus by officers specially selected for the work. As a preliminary to our review we may ask with Conner¹ whether anything of permanent value has been added, by this enormous inquiry, to our knowledge of cardiac disorders and diagnosis. Conner unhesitatingly answers in the affirmative, and points out that the advance has been made not through refinements of laboratory technique but chiefly through the opportunity afforded to examine such an immense number of young men, and to learn the frequency and the extent of normal variations of the physical signs of the heart. This is regarded as the most important gain. Next to this is placed the gain in knowledge of the functional disorders of the heart, especially the so-called irritable heart; and, third, should be placed the advance in the diagnosis of the milder forms of organic valvular disease.

The types of cardiac disease which in civil life are among the most common were very rare. The rarity of syphilitic disease was notable. Among 1,000,000 recruits there were 11,562 rejections for cardiovascular disorders. Of these, twenty were rejected for thoracic aneurism. Aortic incompetence due to syphilis was also rare, and it might almost be stated as a law that *in cases of acquired syphilis the clinical evidence of involvement of the aorta and heart almost never appears before the thirty-fifth year.*

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VARIATIONS OF PHYSICAL SIGNS.

The distinctness and the character of the cardiac impulse depend on the special conformation of the chest. In a flat chest the impulse may be prominent and the area of cardiac dullness may be large, and these signs may readily be taken as indicating some cardiac enlargement. Accidental or functional systolic murmurs were surprisingly frequent. Over the base the true nature of these murmurs is fairly readily recognised, but functional murmurs were frequently apical. Probably nine-tenths of all apical systolic murmurs in young adults are accidental or functional. An important diagnostic point is their inconstancy. They may be absent during rest and present after exercise or during excitement. They may be absent in the erect posture and present in the recumbent position. They have little tendency to be transmitted to the left of the apex. The murmur is obviously only the modified first sound and not something super-added to it as is often the case in mitral incompetence. The functional murmur is rarely so high-pitched or blowing as the murmur of incompetence. The basal systolic accidental murmurs have much the same characteristics. When heard over both aortic and pulmonary areas they may be mistaken for the murmur of aortic stenosis.

The teaching that accidental murmurs are always systolic in time is, in general, sound, even although the statement is not strictly true. The exceptions are rare.

The Irritable Heart of Soldiers.—Although almost every text-book has contained some account of this condition for fifty years, few physicians ever recognised it, and it was looked upon as an affection peculiar to war conditions and without a counterpart in peace times. From the very first day of the army heart examinations, however, this neurosis obtruded itself upon the consciousness of the examiners in no uncertain manner. It was by far the commonest disorder encountered, and transcended in interest and importance all the other heart affections combined. One of the surprising things about the "soldier's heart" was the discovery that in a majority of the cases the symptoms of the disorder were not first manifested under the strain and stress of the war, but had existed in the recruit for years before the onset of his military career. These cases made up the so-called constitutional type of the disorder.

In another large group of cases the symptoms appeared in previously healthy men after an attack of acute illness, such as pneumonia, dysentery, rheumatic fever, or influenza. In most of these "post-infectious" cases there is no reason to suppose that the fact that the patients were soldiers bore any direct relation to the development of the neurosis. The affection is far from being peculiar to the conditions of war or to army life. Only a small proportion of cases

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have their origin in such special conditions. The condition must be of fairly common occurrence in peace times, and with the knowledge of the disorder gained in the war there should be no question of its proper recognition in the future; and the dissemination of this knowledge will constitute one of the most important of the war's contributions to cardiac diagnosis. All the experience of the army heart examinations has shown the great danger of mistaking this neurosis for some organic disease of the heart, in contrast to the very rare error of mistaking such organic diseases for the effort syndrome. The "soldiers' hearts" were very apt to be diagnosed either as myocarditis or as mitral insufficiency or mitral stenosis. It was indeed difficult to believe that a soldier who, on even moderate exertion, showed an array of striking symptoms—dyspnœa, exhaustion, precordial pain, tremulousness, cyanosis, and extreme tachycardia—could be suffering merely from a neurosis. Moreover, many of the physical signs bore a strong resemblance to those of mitral disease.

The widespread impulse often suggested enlargement. The first sound was often sharp and short, the second accentuated. A systolic accidental murmur might be heard, and the suggestion of a thrill was often given to the palpating hand. Because of the rapid heart-rate it was often possible to persuade one's self, erroneously, that this slight thrill was presystolic in time. It is therefore not surprising that a good deal of time was needed to educate the great body of medical officers to the true nature of these cases.

Diagnosis of the Mild Forms of Valvular Disease.—The instances of valvular disease encountered in the army examinations were nearly all of mild type. All the more serious had been eliminated by local boards. It was characteristic of these mild forms of valvular disease that symptoms, as distinguished from physical signs, were lacking. The men affected nearly all gave a normal response to exercise, showed the same physical strength and endurance as normal men, and could be distinguished from these only by the physical signs of the heart. It remained throughout the war an amazing paradox that a disorder in which the heart was known to be intrinsically normal should give rise to pronounced cardiac symptoms, whereas the cases of valvular heart disease were so completely free from symptoms.

The lesions of the aortic valve presented little difficulty. Aortic insufficiency was the one valvular lesion in which the tendency to err was in the direction of making the diagnosis too infrequently. In mitral cases the mistakes were in the direction of finding some valvular disease when it did not exist rather than in overlooking a real lesion.

The effort syndrome was commonly mistaken for mitral incompetence. The tachycardia of "soldiers' heart" is no part of the clinical picture of mitral leakage. One will probably make fewest mistakes in

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the diagnosis of mitral regurgitation by adhering to the rule of never venturing a diagnosis on the presence of a murmur alone, however characteristic it may seem to be. The distinction between mitral stenosis and effort syndrome might be very difficult. A rapid heart-rate during rest is very rare in mild mitral stenosis. On the other hand, anything approaching a normal heart-rate, even during rest, is unusual in "soldiers' heart." An unmistakable presystolic murmur is practically essential for a diagnosis of mitral stenosis, and in the mild grades of valvular disease there are lacking all the pronounced symptoms of dyspnoea on exertion, faintness, pain, palpitation, cyanosis, and sweating with tremor, which are so characteristic of the effort syndrome.

Cohn² gives an interesting historical account of the "cardiac phase of the war neuroses," and pays a tribute to the work done for these cases in the British Army. He lays stress on the nerve aspects of the condition noting the coarse tremor, the areas of anæsthesia and exaggerated reflexes. The symptoms, in the main, are referable to the heart and circulation, but such symptoms occur in four groups of cases:—

1. Chronic disease of the heart, both of endocardium and myocardium.
2. In relation to acute infectious disease.
3. In hyperthyroidism.
4. In the neuroses in peace as well as in war.

1. As regards chronic heart disease, the significance of murmurs has to be considered. The functional murmurs are usually smooth and accompany or follow the first sound, but rough murmurs immediately preceding or forming part of the first sound may occasion difficulty. A roughening of the first sound is common when the rate is rapid, and the second sound is often accentuated. These signs have been accorded too much importance, since their occurrence exceeds the incidence of mitral stenosis at autopsy.

The size of the heart may be misleading. Meakins and Gunson³ found the heart in the neuroses was actually smaller than in their controls when the relation to body weight was considered, but Cohn is unwilling to admit this, holding that in many soldiers, as the result of training, the heart tends to be large. The differentiation between some of the organic cases and the neurosis is often a fine one.

2. The experience is general that after acute fevers the rate of the heart remains increased. The tachycardia is often associated with pain and shortness of breath. Patients are unable to work as well as before. Fatigue or uncomfortable sensations soon terminate effort. When nerve symptoms are present they may be regarded as being superimposed on the cardiac ones. It is doubtful whether the nervous symptoms of the effort syndrome are common under those circumstances. The heart in convalescence from infection and the irritable heart are not the same thing.

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3. Real difficulty arises in distinguishing irritable heart from hyperthyroidism. In both, the pulse is rapid, the size of the heart may be increased, abnormal sounds may be present due to the rapid rate, and tremor is common. The similarity is admitted but there are grounds for distinguishing the two conditions. In the first place in the heart cases there is no genuine exophthalmos, but there is often a look of anxiety which simulates it. The thyroid gland has actually been found to be heavier than usual in men killed in action. The tremor of the effort syndrome is coarser than that of Graves' disease, and increases when attention is drawn to it. The rate of the heart in Graves' disease is not continuously high and falls during rest and sleep, and in that condition the rate of metabolism is above normal.

That malfunction of the thyroid may underlie the condition called irritable heart is still open to investigation, but the specific knowledge so far accumulated fails to bear out the contention.

4. It remains to show on what grounds the irritable heart is regarded as neurotic. There are cases which it is agreed do not fall into the three well-defined groups first discussed. The patients all give the impression of nervousness of the type classed as states of anticipation or anxiety neuroses. The brow is furrowed, the eyes are troubled, the mouth is drawn. The reaction to unexpected noise is prompt and exaggerated. There is shakiness of head, body, and limbs. There is absence of mucous membrane reflexes and exaggeration of tendon reflexes. There is insomnia and disturbing dreams.

Mott⁴ calls them examples of neurasthenia. This is all borne out by the fact that other neuroses have caused difficulty in classification. Among these are gastro-intestinal and respiratory conditions. The anxiety state was readily induced during the war. Descriptions of its terror were familiar so that an anticipation of what he might experience was lively in the mind of the least instructed recruit. The influence of sights and sounds, and the experiences of actual warfare readily wore down the resistance of the timorous and, in time, affected many of the more hardy. Many men passed through the war psychically untroubled, but no one could predict which men were likely to endure. Constitutional predisposition must be taken into account, but as a complete explanation of failure it appears to be inadequate. Other factors bear on the probability that the symptoms of irritable heart depend on a neurosis. The symptoms were all but unknown in the severely wounded. The same may be said of the gassed, and it was commonly admitted that prisoners of war were free from such ailments. All these men were finished with the war.

Viewed as a neurosis, the outlook for rapid recovery is favourable.

Recommendations for the care of the patients were based on British experience. The most important advice was the establishment

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of special camps away from the hospitals. The underlying idea was to give the man specific work, to give him back his morale, his cheerfulness, and his courage. He should emerge from camp ready to undertake his share of the burden willingly. The barracks and huts must be well arranged. Gardening, games, picture shows, athletics, and music were encouraged. The detailing for games and exercise was carried out by specially trained officers. For civil practice this experience has a lesson, and there are problems in therapeutic organisation awaiting solution.

Various attempts to associate some definite change apart from faulty nerve action in the effort syndrome have apparently failed, although some interesting data have emerged.

Adams and Sturgis⁵ investigated "Vital Capacity" and found that in 80 per cent. of "effort syndrome" cases there was a vital capacity of 90 per cent. or more, and that 93 per cent. of cases had a capacity of at least 85 per cent. of the normal standard. Tests of general muscular strength showed no relation between the muscular development and the vital capacity of the lungs.

Observations were also made on the carbon dioxide combining capacity of the blood plasma.

In fifty-four cases this was found to fall within the normal limits.

Mabon⁶ investigated the effect of measured work on the effort syndrome. Work was furnished by full extension from the shoulder of two 5-lb. dumb-bells. Extension and return occupied one second each, and the rhythm was maintained by a metronome. The changes in pulse-rate and blood pressure were observed in fifty patients after the hardest exercise which they could be induced to perform. For the most part patients had symptoms of some years' duration. The amount of work which they could do before becoming fatigued was much less than that done by normal controls. The pulse-rate at rest was higher than in the normal cases, but the rise after exercise and the time for the return of the rate to its resting value were not definitely abnormal.

No "delayed rise" of blood pressure suggesting myocardial inefficiency was observed. The amount of work which the subjects were able to perform usually corresponded closely to their physical strength as determined by tests of the skeletal muscles, and this indicates that lack of development of the skeletal muscular system is a factor to be considered in the cause of the fatigue following slight exertion in certain types of cases of "effort syndrome."

Smith⁷ of Chicago gives an account of cases of tachycardia following influenzal pneumonia. It was found that in many of the convalescents there was a rise in the pulse-rate to 80 or even 120. The rise dated from the time they were first allowed on their feet,

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and some were promptly ordered back to bed. Some complained of shortness of breath, weakness, giddiness, and palpitation on exertion. The point of special interest was whether the influenza had produced some organic disease of the heart such as myocarditis, or had merely brought into the open tachycardias, which otherwise might have gone unnoticed. After careful analysis of the history further differentiation of the cases was made by means of graded exercises, the atropine test and the adrenalin test.

The atropine test was carried out in the same way as for typhoid. Patients were put to bed in a quiet room and the pulse-rate was determined. They were then given $\frac{1}{33}$ gr. of atropine hypodermically. The reaction began in from fifteen to twenty minutes and lasted from forty to sixty minutes. Nineteen of the fifty men tested had an increased pulse-rate of from 1 to 12; twenty-one had an increase from 20 to 30; the remainder had an increase of from 30 to 40. There was no basis, however, for regarding that the action of the vagus in any case had resulted from the influenzal pneumonia.

The same fifty men were given doses of adrenalin. After initial observations of pulse and blood pressure a dose of adrenalin was injected into the deltoid. Records of pulse and temperature were made every two minutes for ten minutes, then every five minutes for an hour, then every ten minutes for half an hour. A positive reaction depended on an increase of pulse and blood pressure of from 15 to 20 points, tremors, palpitation, and increased arterial pulsation. Twenty-five of the fifty men were sensitive to the test, but in the absence of knowledge of their reaction previous to the influenza no conclusions could be drawn. After all the observations on ninety-five cases a diagnosis of acute myocarditis was reached in only one instance.

Organic heart disease did not seem to be the basis of the tachycardia in these men. Many of the cases had an irritable heart before the illness. In twenty of the cases hyperthyroidism was suspected. The graded exercises were of distinct value in estimating the state of the myocardium, and in improving the general condition.

A study of the heart in broncho-pneumonia is germane to our present inquiry. Hart⁸ found that individuals with chronic valvular disease withstood the toxæmia of the pneumonias of the epidemic very badly. Persons with normal hearts who took pneumonia did not ordinarily die from cardiac insufficiency, and post-mortem evidence offered no proof that the heart was essentially damaged. Digitalis acted on the cardiac apparatus in pneumonia in the same manner as in a similar series of heart cases without pneumonia. Digitalis reduced the heart-rate only in cases of auricular fibrillation and in cases where it was given in quantities sufficient to produce an actual auriculo-

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ventricular block. The administration of digitalis did not influence blood pressure.

In view of the widespread belief that death in pneumonia is usually due to heart failure, and the dependence usually placed on digitalis, a critical examination of the evidence is suggested in order that remedies better fitted to combat the true pathological condition may be discovered.

The study of the papers quoted, as well as others, brings conviction on at least the following points:—

1. The frequency of the irritable heart even in civil life; the uselessness of the ordinary cardiac tonics in its treatment, and the benefit of graduated exercises and special institutional treatment.

2. The rarity of myocarditis or other organic heart disease following toxic conditions which might reasonably be expected to cause it, and the frequent explanation of the cardiac symptoms in most of such cases as a neurosis.

3. The distinction between irritable heart and hyperthyroidism, and the comparatively small number of cases of the latter condition.

4. The caution required in diagnosing mild cases of cardiac valvular disease.

5. The rarity of cardiovascular disease resulting from acquired syphilis under the age of thirty-five.

REFERENCES.—¹ Conner, *Amer. Journ. of the Med. Sciences*, December 1919. ² Cohn, *ibid.*, October 1919. ³ Meakins and Gunson, *Heart*, 1918. ⁴ Mott, *Lancet*, 1918. ⁵ Adams and Sturgis, *Amer. Journ. of the Med. Sciences*, December 1919. ⁶ Mabon, *ibid.* ⁷ Smith, *Journ. Amer. Med. Assoc.*, 13th December 1919. ⁸ Hart, *Amer. Journ. of the Med. Sciences*, November 1919.

NEW BOOKS

Food Poisoning and Food Infections. By WILLIAM G. SAVAGE, B.Sc., M.D. (Lond.), D.P.H. Pp. viii. + 247. Cambridge: The University Press. 1920. Price 15s. net.

There are few subjects in Medicine on which there is so much loose thinking and writing as those dealt with in this volume by Dr Savage in a manner as informing as it is interesting. Apart from illness due to metallic contamination of the food, outbreaks of food poisoning are usually spoken of as due to ptomaine poisoning, a phrase that arose in pre-bacteriological days when the nitrogenous products of putrefaction were, perhaps naturally, regarded as the cause of the conditions set up after the ingestion of the incriminated food-stuff. In these days, when so many outbreaks of food poisoning have been bacteriologically investigated both at home and in foreign countries, there is no reason for the continued use of this phrase, which has come to be meaningless. The description by Gärtner of Jena, of the bacillus that has been called after him, and the discovery by many investigators of this bacillus, and of allied forms in the incriminated food-stuffs (usually brawn or other prepared food) as well as in the animal from which the meat came, in the organs of those who have died, and in the dejecta of sufferers, have settled the question as to the causation of food poisoning outbreaks not due to inorganic contamination, accidental or intentional.

In addition to short chapters on foods inherently poisonous, on food idiosyncrasy, and on the history of food poisoning generally, Dr Savage gives details of the clinical and general features of outbreaks of food poisoning, and on the Gärtner group of bacilli in relation thereto. Other chapters deal with food poisoning of unspecified bacterial origin, with certain special kinds of food poisoning, and with Botulism. Chemical poisons in food are also discussed, either unintentionally introduced in manufacture, or added to food from its action on metal containers. Considerable space is devoted to the question of chemical preservatives of food, and the unsatisfactory state of the existing law as to this question is discussed. In order that this matter may be placed on a proper scientific basis Dr Savage suggests that the State, on the advice of experts both technical and administrative, should decide as the kind and quantity of food preservative that is allowable, and embody its findings in the necessary legal form. The decision come to would, of course, not be for all time but subject to revision as our knowledge expanded. In some way such as is indicated progress would seem to lie.

Full details are given of the method of investigating outbreaks of

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food poisoning, and practical recommendations are given for the prevention of this form of disease.

Dr Savage has produced a volume that will be of the greatest value to public health officials, as well as to the medical and veterinary professions generally. But the volume should appeal to the educated public as well, as it deals with a subject of interest to all, and is written in language that any educated person can understand. The Syndics of the Cambridge University Press are to be congratulated on having placed the writing of this volume of their Public Health Series in hands so capable.

Practical Physiological Chemistry. By C. C. CALEB, M.B., M.S. Pp. iv + 252, with 23 figures. Calcutta: Butterworth & Co. 1919. Price Rs. 6 net.

According to the title-page this volume is intended for Indian medical students and clinical assistants; but, apart from an occasional reference to native food-products, as milk, bread, etc., it differs from other books on the subject mainly in the extraordinary amount of work which the author has succeeded in compressing into its 250 pages. Even after allowance has been made for the numerous methods marked "advanced," which are included for the benefit of the clinical assistants, it seems hardly possible that any present-day medical curriculum could find the time necessary for such an extensive series of experiments. Still, by judicious selection an excellent course of practical work could easily be arranged.

The instructions for performing the experiments are clear and concise, and explanatory notes of the tests and reactions are a prominent feature of the book. Whether the latter will have the intended effect of minimising unintelligent and mechanical work on the part of the student is, to say the least, doubtful.

No pains have been spared to avoid errors, both typographical and chemical.

Military Psychiatry in Peace and War. By C. STANFORD READ, M.D. (Lond.). Pp. vi + 168. With 2 Charts. London: H. K. Lewis & Co., Ltd. 1920. Price 10s. 6d. net.

The writer of this book is avowedly a disciple of Freud or at any rate of the more advanced school of the new clinical psychology. It is inconceivable, however, that even an opponent of these doctrines should fail to recognise the masterly grasp of the problems of psychiatry which the author displays. He illuminates every subject he touches upon and the book is a valuable contribution not only to war psychoses but to psychiatry in general. If the diction is occasionally careless the book as a whole is a living document inspired by

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the author's personality and enthusiasm. It can be confidently recommended both to the specialist and the medical profession generally as a readable, interesting, and instructive treatise.

A Manual of Practical Anatomy. By THOMAS WALMSLEY. Part I. Pp. 169, with 59 illustrations. London: Longmans, Green & Co. 1920. Price 9s. net.

In this book the author, at the suggestion of Professor Bryce of Glasgow, has made the innovation of laying most stress on the directions as to dissecting, the descriptive matter being printed in smaller type. This is the reverse of the procedure in most practical manuals, the author's belief being that it is of more importance for the student to be able to recognise structures and to relate them to each other than that he should memorise facts about them. The wisdom of this new departure may easily be questioned, since, although it is certainly important that the student should be able to identify structures and to find his way readily about the part, it is often of equal, and probably of greater, importance, that he should know such facts as the attachments and nerve supply of muscles. This new plan is calculated to cause him to underestimate the importance of the latter facts.

Whether the author is right or wrong in the arrangements of his material, he has produced a very clear and well-written book. The illustrations are simple and readily understood and exactly suited to the needs of the student. The addition of diagrams of the bones illustrating the attachment of the muscles and ligaments and a brief reference to the action of muscles would enhance the value of the book. We are glad to see that the B. N. A. terminology has been used throughout, with a few minor modifications.

Manual of Obstetrics. By O. ST JOHN MOSES, M.D., D.Sc., F.R.C.S., F.R.S. (Ed.), Major I.M.S. Pp. viii + 528, with 136 illustrations. London: J. & A. Churchill. 1920. Price 21s. net.

Major St John Moses does not claim originality for his work; and students of the late Dr Milne Murray will be glad to find in it the arrangement of the subject and the views and illustrations of their great master—sometimes his very words. The book is therefore excellent and admirably adapted to the purpose for which it is written. Subjects which Milne Murray had made peculiarly his own, such as axis traction forceps, are treated at length. The paragraph on the use of scopolamine and morphine in labour should be re-written; and some reference should be found to such questions as toxæmia of pregnancy and the work of Whitridge Williams on the estimation of the ammonia coefficient of the urine.

NEW EDITIONS

Diseases of the Throat, Nose, and Ear for Practitioners and Students.

By W. G. PORTER, M.B., B.Sc., F.R.C.S.E. Third Edition, fully revised under the Editorship of A. Logan Turner, M.D.Ed., F.R.C.S.E. Pp. 300, with 79 Illustrations. Bristol: John Wright & Sons, Ltd. 1919. Price 12s. 6d.

As the readers of this Journal know, Major Porter, D.S.O., while serving with the Royal Field Artillery in France, was killed in action on 8th June 1917. His old friends and former colleagues in Edinburgh, have carried out the work of revising his book, so that it is now possible to publish a third edition. No attempt has been made to alter the general character of the work. Dr J. K. Milne Dickie has considerably enlarged the chapters on Examination of the Ear, especially in connection with the vestibular tests. Dr J. S. Fraser has extended the section on Suppuration in the Labyrinth, Nerve Deafness, and Otosclerosis. The Chapters on the Pharynx have been re-read carefully and brought up to date by Dr Douglas Guthrie, while those dealing with the diseases of the Nose have been treated in a similar way by Dr W. T. Gardiner. Dr Turner himself is responsible for the revision of the sections dealing with diseases of the Larynx and the Nasal Accessory Sinuses.

Manual of Gynaecology. By SAMUEL J. CAMERON, M.B., B.Ch., F.R.F.P.S.G., University of Glasgow. Second Edition. Pp. 559, with 256 Illustrations. London: Edward Arnold. Price 25s.

The call for a second edition of Dr Cameron's Manual within five years of its first publication is evidence that his book has taken the favourable position which we anticipated for it. It is eminently a practical book, and one that senior students will be glad to carry into practice with them, and consult when faced with their first gynaecological cases. In addition it is a book which specialists will be interested in, for it embodies the author's considerable experience, and the views, in general, of the Glasgow School.

The new edition has been revised and brought up to date, and enriched by several new illustrations. Amongst the latter are plates illustrative of the operation which the author has devised for prolapse in women past the menopause. As the author himself frankly admits, the operation is anatomically unsound, consisting as it does in the grafting of the stump of the amputated cervix into the perineal tissues. It is not to be expected that this distinctly unsurgical operation will

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prove a permanent addition to gynæcology, and we shall look forward with interest to Dr Cameron's remoter results. Happily the author's own frankness disarms criticism. We cordially commend Dr Cameron's manual to the favourable attention of students and practitioners.

Diseases of the Skin. By R. L. SUTTON. Third Edition. Pp. 1084.
With 921 Illustrations. London: Henry Kimpton. 1919.
Price 42s. net.

This book is brought up to date by including various types of dermatitis due to tetryl and similar explosives, and the latest knowledge of the management of disorders due to animal parasites. By devoting more space to syphilis than in previous editions, the author follows the trend of modern opinion, which is to link syphilis and dermatology more closely.

Unlike most British dermatologists he is a believer in the value of tuberculin in the treatment of *Lupus vulgaris*, and devotes more space to it than to any other remedy for that disease.

The book is well suited for the practitioner with some knowledge of skin diseases, but a little more detail with regard to treatment would be helpful to the student.

The volume is profusely illustrated with excellent photographs; the type is clear and well spaced. To this edition the author has added 77 illustrations, 3 coloured plates, and nearly 70 pages of text. The subject-matter is presented in a concise manner, and the book is very readable. At the end of each chapter is the index of references for the disease dealt with, an arrangement which allows the reader to follow up the literature of the subject with a minimum of trouble. On the whole it is a most admirable and comprehensive treatise.

NOTES ON BOOKS

A text-book so well known as Professor Halliburton's *Essentials of Chemical Physiology* (Longmans, Green & Co., 1919, price 7s. 6d. net) needs little recommendation. The present edition (the tenth) has been brought thoroughly up to date by the introduction of much new material, including some of the recent work on the mechanism of gaseous exchange, and the newer methods of microchemical analysis applicable to the blood. The book is divided into twenty-five lessons, the first twelve of which constitute an elementary course, while the remaining chapters are devoted to more advanced matter. At the beginning of each section, clear and concise directions are given for practical work, and these are followed by an account of the theoretical principles on which the experiments depend. Students and teachers of chemical physiology will find this volume of great assistance to them.

Diseases of the Ear, by Edward Bradford Dench (D. Appleton & Co., 1919, price £1, 10s.). It is unfortunate that this excellent text-book has not been more thoroughly modernised in the present, (its fifth) edition. The author states that although a new chapter on the labyrinth has been added, the main body of the text has remained unaltered, the work can, therefore, scarcely be regarded as a satisfactory exposition of present-day otology. We can however especially commend the sections on treatment. The chapter on anatomy is complete and well illustrated. Hearing tests are clearly described, but the majority of otologists now prefer the monochord to the Galton whistle as a means of ascertaining the upper tone limit. While non-suppurative disease of the middle ear is considered in detail, otosclerosis is hardly given the prominence to which its extreme frequency entitles it.

Among the descriptions of operations for the relief of otorrhœa and its intracranial complications there is no mention of the conservative mastoid operation, a procedure which is now widely adopted.

The doctor whose patient is not within reach of skilled dental aid, will find the second edition of Mr C. E. Wallis's *Atlas of Dental Extractions* (J. & A. Churchill, 5s. net) very useful, as it contains clear and concise notes on the commoner causes and the relief of dental pain short of extraction.

Mr J. Hutchinson's book on *Facial Neuralgia and its Treatment* (John Bale, Sons & Danielsson, Ltd., price 15s.) has long been recognised as the standard English work on the subject. In a second edition the author has added much valuable information particularly on alcohol injections and on the operation for removal of the Gasserian ganglion.

BOOKS RECEIVED

ABRAHAM, ADOLPHE.	Hershell's Textbook of Indigestion. Fourth Edition	(<i>Edward Arnold</i>)	10s. 6d.
BARDSWELL, NOEL DEAN.	Advice to Consumptives. Second Edition	(<i>A. & C. Black, Ltd.</i>)	3s. 6d.
BORRADAILE, L. A.	A Manual of Elementary Zoology. Third Edition	(<i>Henry Frowde and Hodder & Stoughton</i>)	18s.
BROWN, W. LANGDON.	The Sympathetic Nervous System in Disease	(<i>Henry Frowde and Hodder & Stoughton</i>)	10s. 6d.
BULLOWA, JESSE G. M.	Beechhold's Colloids in Biology and Medicine	(<i>D. Van Nostrand Company</i>)	—
COOPER, ARTHUR.	The Sexual Disabilities of Man. Fourth Edition	(<i>H. K. Lewis & Co., Ltd.</i>)	7s. 6d.
EDEN, THOMAS WATTS, and CUTHBERT LOCKYER.	Gynæcology. Second Edition	(<i>J. & A. Churchill</i>)	38s.
FLETCHER, CAVENDISH, and HUGH M'LEAN.	The Link between the Practitioner and the Laboratory	(<i>H. K. Lewis & Co.</i>)	4s. 6d.
FRIEL, A. R.	Electric Ionization	(<i>John Wright & Sons, Ltd.</i>)	8s.
HARDWICKE, W. W.	Sight Testing made Easy. Fourth Edition	(<i>J. & A. Churchill</i>)	5s.
HARRISON, L. W.	Manual of Venereal Diseases for Students	(<i>Henry Frowde and Hodder & Stoughton</i>)	16s.
HIRST, JOHN COOKE.	A Manual of Obstetrics	(<i>W. B. Saunders Co., Ltd.</i>)	14s.
HOLT, L. EMMETT, and JOHN HOWLAND.	The Diseases of Infancy and Childhood. Seventh Edition	(<i>D. Appleton & Co.</i>)	35s.
LANGLEY, J. N.	Practical Histology. Third Edition	(<i>W. Heffer & Sons, Ltd.</i>)	10s. 6d.
MILLER, H. CRICHTON.	Functional Nerve Disease	(<i>Henry Frowde and Hodder & Stoughton</i>)	8s. 6d.
MOCK, HARRY E.	Industrial Medicine and Surgery	(<i>W. B. Saunders Co., Ltd.</i>)	42s.
STARLING, ERNEST H.	Principles of Human Physiology. Third Edition	(<i>J. & A. Churchill</i>)	25s.
STEWART, Sir JAMES PURVES.	The Diagnosis of Nervous Diseases. Fifth Edition	(<i>Edward Arnold</i>)	30s.
THOMSON, H. HYSLOP.	Tuberculosis and Public Health	(<i>Longmans Green & Co.</i>)	5s.
WATSON, JOHN B.	Psychology from the Standpoint of a Behaviorist	(<i>J. B. Lippincott Company</i>)	10s. 6d.
WHITE, CHARLES F., and W. HERBERT BROWN.	An Atlas of Primary and Cutaneous Lesions of Acquired Syphilis in the Male	(<i>John Bale, Sons and Danielsson, Ltd.</i>)	27s. 6d.

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EDITORIAL NOTES

WE record with deep regret the death of Dr John Batty Tuke of New Saughton Hall, which took place unexpectedly in London on 11th April. Born in 1860, he was educated at Edinburgh Academy and in the University of Edinburgh, where he graduated M.B., C.M. in 1881, and M.D. in 1890.

**The late
Dr John Batty
Tuke.**

At a recent meeting of the Royal College of Physicians of Edinburgh, the President, Sir Robert Philip, referred to the loss the College had sustained, in the following terms:—

John Batty Tuke passed away on the 11th of April. A Fellow of thirty-one years' standing, he bore a name greatly honoured in this College. Like his distinguished father, he had a warm interest in everything that concerned its welfare. Only a few months ago it was my privilege to sit next him at a Club dinner, and in his simple, unobtrusive way he showed how close to his heart it lay. In association with his father he devoted himself to the department of mental diseases, and for the last few years of his life was in charge of New Saughton Hall, close to Loanhead. He went in and out among his patients in most kindly, sympathetic fashion, a watchful, reliable, and helpful physician. His gentle, lovable nature made many friends and attached us closely to him. Our hearts go out in warm sympathy to his devoted and sorrowing wife.

THE news of the death of Dr George Thyne, at the early age of 52, came as a shock to his many friends in Edinburgh. On Saturday, 8th May, he set out on a round of visits, returned to his house in the course of the morning feeling very ill and never afterwards rallied, his death taking place on the following Monday from gradual heart failure.

**The Late
Dr George Thyne.**

George Thyne took his professional duties very seriously, and it was known to his intimate friends that the strain of a large general practice had for some time been weighing heavily on a constitution never too robust. Although he had long resisted any suggestion that he should curtail his responsibilities, he had at length decided to give up practice and had made arrangements to retire. Always a great

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lover of the country, he had secured a cottage at Stenton in Haddingtonshire, where with his wife, his garden, and his beloved 'cello he looked forward to enjoying a well-earned rest.

One of a large family, of which five entered the medical profession, George Thyne commenced practice in Leith about thirty years ago, removed to the northern district of Edinburgh within a year and rapidly acquired a large practice, which, as the years passed, became very widespread.

The writer, from a long and intimate personal association, can testify, not only to his unselfish devotion to his own patients but to his ever ready help to his professional friends, by all of whom he will be sadly missed. Thyne lies buried in the little churchyard of Stenton within a few hundred yards of the home which he and his wife had been preparing with such happy anticipations. Much sympathy is felt with his widow and his brothers. H. T. T.

WE gladly comply with a request to bring the following appeal to the notice of our readers:—"The Invalids' Auxiliary **Edinburgh Medical Missionary Society** of the Edinburgh Medical Missionary Society supplies a stimulus which has proved of great value to many invalids, especially those who have become self-centred. Medical men would find it very helpful to such patients were they to interest them in the work of this Auxiliary, and get them to contribute such things as they might be able to make. There is a sale, towards the end of each year, of the work sent in; and a committee of ladies apportions the proceeds among various medical missions in India and elsewhere. Ladies correspond with the contributors and let them know how the proceeds of the sale are distributed, and how greatly the missionaries and their patients appreciate the small grants. Particulars may be obtained from Miss Clark, 16 Coates Gardens, or Miss Walker, 65 George Square, Edinburgh."

AT the Examinations of the Board of the Royal College of Physicians **Triple Qualification** of Edinburgh, Royal College of Surgeons of **Passes.** Edinburgh, and Royal Faculty of Physicians and Surgeons of Glasgow, held at Edinburgh in April, the following candidates passed the Final Examination and were admitted L.R.C.P.E., L.R.C.S.E., L.R.F.P. and S.G.:—Albert Christian Lornie, Cambusnethan; Harry Barlow, Wigan, Lancs.; Robert Charles Dow, Edinburgh; William Grant, Grantown-on-Spey; Robert Smith, Newmains; George Shuttleworth Barnett, Saltburn-by-Sea, Yorkshire; Owen Fitzpatrick, Rathfriland, Co. Down, Ireland; George Murray Shaw Lindsay, Edinburgh; Harry Cohen, Edinburgh; Francis Paul M'Nulty Clarke, Ballina, Co. Mayo; George Malayramon

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Kerry, British Guiana; Anand Shridhar Paranjpo, Bombay, India; Elly Isserow, Russia; and John Francis Edward Burns, Ireland.

Twenty-four candidates passed the first professional examination; thirteen passed the second professional, and seventeen passed the third professional examination.

At the meeting of the College held on 19th May, the following gentlemen, having passed the requisite examinations, had the Higher Dental Diploma conferred upon them:—Douglas L. C. Radford, L.R.C.S.E. (Triple), L.D.S.Edin., Edinburgh; Charles H. Kembell, L.D.S.Edin., Edinburgh; James D. Hamilton Jamieson, L.D.S.Edin., Edinburgh.

The following gentlemen, having passed the requisite examinations, were admitted Fellows:—John S. Arkle, M.B., B.S.Durh., Newcastle-on-Tyne; Cyril V. Baigent, M.B., Ch.B. New Zeal., New Zealand; Harry Banks, L.M., M.B., B.Ch. Dublin, Aberdare, S. Wales; Max R. Boe, M.D., C.M. Toronto, Canada; August L. Buchanan, M.B., Ch.M. Sydney, Australia; Charles H. Corbett, M.D.Edin., Trowbridge, Wiltshire; Pares C. Datta, M.B., Ch.B.Edin., India; John N. F. Ferguson, M.B., B.Ch. Cantab, York; Frank C. Greig, M.R.C.S.Eng., L.R.C.P.Lond., Nottingham; Edward W. Hall, M.R.C.S.Eng., L.R.C.P.Lond., Eastbourne; Arthur D. Haydon, M.B., B.C.Cantab., Shrewsbury; Ashley E. Herman, M.B., B.C.Cantab, Royal Naval Hospital, South Queensferry; William H. Johnston, M.D.Edin., Wellington, New Zealand; Gideon J. Joubert, M.B., Ch.B.Edin., Edinburgh; Charles H. Laver, M.R.C.S.Eng., L.R.C.P.Lond., Portobello; Arthur P. Lawrence, M.B., B.S.Melb., Australia; Crichton R. Merrillees, L.R.C.S.E. (Triple), Australasia; Ronald K. Merson, M.R.C.S.Eng., L.R.C.P.Lond., Hull; Ryder P. Nash, L.R.C.S.E. (Triple), Brighton; John M. Pringle, M.B., Ch.B.Edin., Sheffield; Frank H. Robbins, M.R.C.S.Eng., L.R.C.P.Lond., London; Harold F. Seymour, M.D.Lond., Brighton; Frederick M. Spencer, M.B., Ch.B. New Zeal., New Zealand. Robert Stevenson, M.B., Ch.B. St And., Johannesburg; Claude B. Tudehope, M.B., Ch.B. Edin., Auckland, New Zealand; Cuthbert A. Verge, M.B., C.M. Sydney, Australia; Rankin G. Walker, L.R.C.S.E. (Triple), Lochee; Andrew Walbrugh, M.D.Edin., Durban, Natal; Norval J. Watt, M.B., Ch.B.Edin., Krugersdorp, Transvaal; Harold Williamson, M.B., B.S.Durh., Basrah, Mesopotamia; Gordon S. Woodman, M.B., B.S.Durh., Gateshead-on-Tyne.

The Bathgate Memorial Prize was, after a competitive examination in Materia Medica, awarded to Mr Herbert John Appleyard.

The Ivison Macadam Memorial Prize in Chemistry was awarded, after competitive examination, to Mr Leonard Alexander Watson.

STUDIES ON INFLUENZAL PNEUMONIA AND ITS TREATMENT.

(From the Internal Clinic at the University of Lund, Sweden.)

By PROFESSOR KARL PETRÉN.

DURING the great epidemic of influenza of 1918-19 I treated a large number of cases of influenzal pneumonia (about 300) in my clinic. I have felt it to be my duty to study these cases and to see how far it is possible to penetrate into the nature of the disease.

In this paper I propose to treat especially of certain questions regarding influenzal pneumonia — the difference between ordinary lobar pneumonia and the influenzal type, and, in particular, those distinctions that are revealed by X-ray examination. I shall also discuss the pathogenesis of the accompanying cyanosis, and the true nature of influenzal pneumonia; finally, I shall speak of the treatment of the disease, with special reference to the use of convalescent serum and neosalvarsan.

NOTES ON THE EPIDEMIOLOGY OF THE DISEASE.

As regards the epidemic in Sweden, the first remark I wish to make is that it began, in the months of July and August 1918, with general and catarrhal symptoms, but without any evident signs of pneumonia and with a very low death-rate; whilst the severe epidemic with a large percentage of cases of pneumonia and of cases with a very high mortality only commenced in Sweden, as it did over the whole world, in the end of September, continuing, although with some variations, to the end of January 1919. The general type seems to have been very much the same everywhere—except that the different stages of the epidemic did not occur at quite the same epochs in different countries.

To give an idea of the frequency of the disease, I reproduce (after Bloch) figures showing the number of deaths from influenza in the towns of Sweden (with a population of about 1,650,000) during the different months of the epidemic: in July 1918, 29; in August, 321; in September, 728; in October, 3318; in November, 2200; and in December, 1175.

Horder has remarked that during the epidemic of influenza

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in December 1918, poliomyelitis was more frequent in England than usual. During the epidemic in Sweden we have not seen cases of poliomyelitis, or, at all events, no more than usual. In the course of the last twenty years, as is well known, we have had in Sweden several severe epidemics of poliomyelitis, and at present (August 1919) the epidemic of influenza having ceased, we have again got a somewhat higher incidence of poliomyelitis. We therefore conclude that, if a coincidence has existed in some places as to the time of the epidemic of influenza and a great number of cases of poliomyelitis, such coincidence has been only accidental.

The study of the ordinary cases of influenza treated at this hospital do not give us an answer to the question of the frequency of pneumonia in the late epidemic, as, in general, no other out-patients with influenza were admitted to the hospital but those in whom the diagnosis of pneumonia had been made, and, in fact, only the cases of severe pneumonia which seemed to have a bad prognosis. Evidence on this point has been obtained, however, from the cases occurring in members of the Staff of the hospital. My assistants, Drs Ingvar and Ruth Johansson, on whom the care of these cases devolved, have examined this question, and have concluded that among the Staff of the hospital (numbering about 450)* 229 cases of influenza have occurred, or about 55.5 per cent., and among these there were twenty cases of influenzal pneumonia (or 8.7 per cent. of all the cases of influenza). Other authors have found a much greater relative number of pneumonia, *e.g.*, Graham reported 239 cases of pneumonia among 723 cases of influenza (33 per cent.), and F. Meader the incidence of influenza as 28 per cent., of whom 32 per cent. developed pneumonia.

TIME ELAPSING FROM THE BEGINNING OF THE INFLUENZA TO THE APPEARANCE OF THE SYMPTOMS OF PNEUMONIA.

I have examined the question as to the time that elapsed between the beginning of the attack of influenza to the appearance of the symptoms of pneumonia. The beginning of the

* The ordinary number of persons belonging to and living in the hospital is 367, but as the epidemic lasted for almost a year, and during the year there were many changes in the Staff, I estimate the total number for the whole year to be about what I have stated above.

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pneumonia is not always distinctly marked in the history of the case, but, in the majority of instances, one can conclude when the pneumonia set in. The cases in which I have obtained an answer to this question have given the following result. (I have distinguished between the fatal cases and the others.)

Among the Fatal Cases.				Among the Surviving Cases.	
Not more than 3 days	.	22 cases (34%).		44 cases (31%)	
4 to 5	„	26 „ (41%).		47 „ (34%)	
6 „ 10	„	13 „ (20%).		37 „ (26%)	
10	„	3 „ (5%).		12 „ (9%)	

From these figures one can conclude that pneumonia is not a late “complication” of influenza, but that one can generally recognise its symptoms shortly after the beginning of the influenza, and, in the majority of cases, within the first five days. I shall return later to the problem of the nature of influenzal pneumonia, on which I think my observations may throw some light.

Moreover, one can see from these figures that in fatal cases pneumonia has, in general, set in after a rather shorter time than in the surviving cases; the difference is certainly not great, but it seems to me probable that it is not purely accidental.

My experience on this point agrees with what Citron has reported of the epidemic in 1918 in Berlin, namely, that the pneumonic symptoms generally appeared 3-4 days after the beginning of the influenza. Staehelin also speaks of the third or fourth day as the most usual for the beginning of the pneumonia. Horder says that the symptoms indicating pneumonia generally set in about the fourth or fifth days.

If we compare this with the experience gained in the epidemic of influenza of 1889-90, we note that Warfvinge (Sweden) found that the pneumonia commenced within the first five days after the beginning of the influenza in 52 per cent. of the cases. Heubner found in the same epidemic (1889-90) that the pneumonia had generally set in within six to nine days after the beginning of influenza.

This comparison seems to show that *the interval between the beginning of the influenza and the appearance of the symptoms of pneumonia has, in general, been rather shorter in the epidemic of 1918 than it was in the older epidemic of the years 1889-90.* It seems to me most probable that this difference between the

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two epidemics is in causal connection with the more serious prognosis of the recent as compared with the earlier epidemic.

SYMPTOMS OF INFLUENZAL PNEUMONIA.

The most practical way to characterise the features of influenzal pneumonia seems to be to contrast that disease with the usual lobar type of pneumonia.

In general, one can say that influenzal pneumonia does not show such characteristic and typical features as ordinary lobar pneumonia. In the former, individual cases show rather more various and greater differences between each other than one generally sees in lobar pneumonia. To the question of the cause of these differences I shall return later.

If we first regard *the manner of onset of the diseases*, the difference between them is very striking. It is not necessary to say more about the symptoms at the onset of lobar pneumonia than that it begins abruptly, very often in a person in full health, and with a severe chill; that immediately after the chill the fever is high and the symptoms of general involvement are strongly developed. In influenzal pneumonia, the onset is characterised by fever, headache, and diffuse pains in the limbs and back, and after a short time also by cough. Very often the patients report that a few days thereafter the symptoms become worse, the fever higher, the cough more severe, and often also a rigor, although not well developed, has occurred. From these symptoms one can conclude that the pneumonia has begun at this time. This difference in the clinical picture as regards the beginning of the two diseases is, in my opinion, very important, and renders good service in making the diagnosis between them.

THE PHYSICAL SIGNS OF THE DISEASE.

When we consider the signs and symptoms of the developed disease we must admit that their elements are the same in both diseases, but nevertheless the difference between them is generally well marked.

In influenzal pneumonia the physical signs do not follow the limits of the lobes, as in ordinary lobar pneumonia, but are especially observable at the bases, though in some cases they may also appear at other parts of the lungs. As regards the individual physical signs, percussion is very often only slightly

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impaired, though sometimes well-marked dulness is observed. Bronchial breathing is occasionally present, but very seldom reaches the marked development that is so characteristic of ordinary lobar pneumonia. Râles can be detected in the affected parts of the lungs much more frequently than bronchial breathing. These râles are of very different kinds, quite fine râles are common, but almost every kind of râle can be heard and their number varies much in the different cases.

In considerably over 100 cases of influenzal pneumonia *I have examined the lungs by means of X-rays*, using a fluorescent screen, but not photographic plates. I can find little reference to such examinations in the medical journals, though Longcope states that X-rays show "scattered shadows" throughout the lungs.

My results are as follows. In some cases in which I have diagnosed influenzal pneumonia I have not seen anything pathological on the screen. As the pneumonic process in influenza begins in small scattered foci it is not surprising that these foci must attain a certain development before they can be detected on the screen. One might have expected, however, that the manifestations of the morbid affection of the lungs would be visible on the screen as early as the diagnosis could be established by ordinary physical examination, but one can only record the results of actual experience.

The majority of the cases, however, have shown distinct changes on examination with X-rays. These have been of very different kinds. An observation common to all the cases has been that the veiling in the lung areas has never attained any great degree of density.

It may be convenient at this point to make a comparison with what one observes by X-rays in ordinary lobar pneumonia. And, firstly, I would remark that ordinary lobar pneumonia is characterised on the fluorescent screen by dark and diffuse shadows that extend over a great part of the lung areas, their extension very often corresponding to the limits of one or more lobes; also, in general, these shadows are very sharply outlined.

The appearances that one sees in cases of influenzal pneumonia vary within wide limits, but one can never find the features belonging to ordinary lobar pneumonia well developed. The most general type consists in scattered shadows which are of about the size of hazel-nuts or smaller, not sharply limited and of quite irregular shape, but generally present in great numbers. In other cases the shadows are larger, of the size

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of walnuts or considerably more extended. These occur especially in the central parts of the lungs. Moreover, one may say, that, as a rule, these shadows are more developed in the basal than in the upper parts of the lungs. But there are occasional exceptions to this rule, and there is no part of the lung area where one may not in some cases see shadows.

The most usual departure from the type described is caused by the frequent marked tendency of focal patches to become confluent. In consequence of this one can see a territory with a quite homogeneous shadow as large as an egg or an orange, or occasionally even larger than the palm of the hand. Such a shadow is only seen in the central part of the lung fields. I have also seen shadows with very great extension in the basal parts of the lung fields, with but a narrow strip of clear lung between the shadow and the diaphragm.

The intensity of all these varieties of shadow is never great and is always much feebler than in ordinary lobar pneumonia. I have often, undoubtedly, seen shadows with a high degree of density at the bases of the lungs, but in these cases I could never exclude the presence of an effusion in the pleural sac.

This description of the appearances of influenzal pneumonia on the screen corresponds well with the picture found in broncho-pneumonia. Such modifications from that picture as exist are all due to the unusual extension of the foci in influenzal pneumonia and their strongly marked tendency to become confluent.

From a general point of view one can say that the physical signs, including the phenomena noted on X-ray examination, though they present somewhat different clinical pictures in different cases, correspond in general to those of broncho-pneumonia, whilst the observed differences can be explained by difference in extension of the morbid affection in the lungs, that is to say, by a purely quantitative factor. From a pathological point of view the process is characterised by the fact that these small foci of pneumonia have frequently a very great tendency to spread and to become confluent.

NOTES ON SYMPTOMS OTHER THAN THE PHYSICAL SIGNS.

If we take the other symptoms of these diseases into consideration, it is, in my experience, an almost invariable rule that in influenzal pneumonia pain in the side on respiration is but little marked, the patients not seldom being wholly free from pain. In a series of observations that I made in autumn,

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out of 80 cases 30 were free from pain. The difference in this respect between influenzal pneumonia and ordinary lobar pneumonia seems to me to be very distinct.

As regards **the sputum** the features of the two diseases are also very different. It is well known that the sputum in influenzal pneumonia is very often blood-stained, and it may in some measure approximate to the rusty sputum of lobar pneumonia; but in my experience it never or hardly ever quite corresponds to this type of sputum. Very often the sputum of influenzal pneumonia in a greater or less degree consists of pus or mucus of a pinkish colour, and the variety of appearances which are presented by the sputum is easily explained by the varying amount of the elements of which it is composed.

I have the impression that the sputum during different epochs of the epidemic has varied somewhat in character, and I have particularly observed that sputum much but not quite resembling the typical sputum of lobar pneumonia has sometimes occurred at the beginning of the epidemic (September-October), whilst later I have not found sputum of this character.

Tenacity of the sputum which is so characteristic of lobar pneumonia was regularly present in influenzal pneumonia in a greater or less degree; just as in my experience it is generally observed in every kind of bronchopneumonia. In my opinion, when this physical character of the sputum is seen, it is a sure sign that a pneumonic process of some kind exists in the lungs.

As regards the general aspect of the patients, one hardly ever sees the colour that characterises the face in ordinary lobar pneumonia, and which I regard as due to a combination of active hyperæmia and a certain degree of cyanosis—the latter in general not strongly developed. Influenzal pneumonia has very often been characterised by a most marked **cyanosis**, a truly violaceous colour of the face, which can attain a very high degree. This is reported by so many authors that I need not describe the symptom at greater length.

The production of this cyanosis may be explained in two ways. On the one hand, owing to the very great extent of the lesion, there may be insufficient lung tissue left for respiration. We know well that pneumonia is very often developed on both sides, and my observations on the screen by X-rays serve to confirm the assumption as to the great extension of the morbid affection in the lungs in many cases. In a paper

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published in Sweden, I have spoken of the possibility of explaining the cyanosis in this way. It has indeed seemed to me that the patients have often died of actual suffocation. Horder has also expressed a like opinion on this matter.

On the other hand, it has been surmised that the cyanosis may be a toxic effect, the consequence of vasomotor debility or paralysis.

It is a striking fact that in every case these patients with highly developed cyanosis, and often with severe dyspnœa, show very little disturbance from a psychical point of view. They are not restless, in the way one often sees in severe cases of ordinary lobar pneumonia or even in broncho-pneumonia. They seem, indeed, to be entirely occupied by the difficulty of breathing—of obtaining the air that they require. These patients often continue in this state till their death. I have, however, seen a few exceptions to this rule, and in these cases the patients have suffered from anxiety which was sometimes very great and continued for one or two days before death.

The fact that influenzal pneumonia is not combined with a leucocytosis, as is frequently the case in ordinary lobar pneumonia, but is characterised by a *leucopenia*, has been mentioned by many authors, such as Kennet, Goadby, Whittingham and Sims, E. R. Hunt, Citron, Fleischmann. I shall not here take up room by citing details from the researches of these authors but shall confine myself to what has been found in my clinic.

Table of the Results of the Enumeration of the White Blood Corpuscles.

Number of Cases where the White Blood Corpuscles were between	Cases of Pneumonia (without Pleurisy).	Cases of Pneumonia (with Pleurisy).	Cases of Influenza (without symptoms of Pneumonia).
1,000 to 2,000	2 (2)	...	...
2,001 " 3,000	1 (1)	...	...
3,001 " 4,000	9 (7)	2 (2)	1 (1)
4,001 " 5,000	8 (5)	1 (1)	2 (2)
5,001 " 7,000	28 (21)	6 (5)	6 (2)
7,001 " 10,000	33 (15)	8 (6)	12 (6)
10,001 " 12,000	10 (4)	6 (4)	6 (3)
12,001 " 15,000	19 (3)	7 (3)	1
15,001 " 20,000	11 (5)	5 (3)	2
20,001 " 30,000	7 (2)
Total . . .	128 (65)	35 (24)	30 (14)

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The figures for the two first months (September-October) are cited in brackets. The other figures correspond to the whole epidemic.

We see from these figures that a certain number of the cases of influenzal pneumonia have shown leucopenia (the smallest numbers we have found were in three cases: 2800, 1900, and 1200), but this is only in a small minority of the cases. One sees, further, that the number of cases with the normal number of white blood corpuscles (5000-10,000) is greater than that of cases with leucocytosis.

As regards the number of white blood corpuscles, it is evident that the character of the epidemic has changed. From the figures in parenthesis, which belong to the two first months of the epidemic (September-October), one sees immediately that the difference between the two epochs of the epidemic, as regards this point, is marked; the cases of leucopenia having been much rarer and the cases of leucocytosis much more frequent in the later epoch than during the first.

The same difference between these two epochs is also marked to a certain degree for the cases complicated with pleurisy, and also for the cases of influenza free from pneumonia, *i.e.*, cases from persons belonging to the Staff of the Hospital. If we compare the cases with pneumonia only with those complicated with pleurisy, we find in the latter a relatively greater number of cases of leucocytosis (51 per cent. against 37 per cent.), and this difference seems to me to be not simply accidental. In the first epoch this difference was even more marked (42 per cent. and 21, 5 per cent.). In any case, one must conclude that the effect of the pleurisy in producing leucocytosis has been only slightly marked. Among the cases without pneumonia the leucocytosis has not been so frequent (only 30 per cent.).

As to the different forms of white blood corpuscles, I have only to remark that in some cases the eosinophils decreased or were even absent. Whittingham and Sims have found the same.

With regard to **the pulse rate**, it is mentioned by many authors (Peacocke and others) that in some cases this has been slow during the whole course of the disease. I have also observed the same in several cases. On the other hand, one never sees in influenzal pneumonia that decrease of the pulse rate that is so characteristic of ordinary lobar pneumonia at

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the period of crisis. As the majority of cases of influenzal pneumonia have increased pulse rate, this difference between the two pneumonias is very marked, and is, in my opinion, an important phenomenon. As this sudden decrease of the pulse rate at the crisis of lobar pneumonia must be caused by the biological interaction of the micro-organisms and our organism, and as it has not been observed in influenzal pneumonia, we are led to conclude that the micro-organisms of influenzal pneumonia have different biological features from those of lobar pneumonia.

Among the *symptoms* to be discussed there remain those of the *urine*, which have attracted much attention recently in the medical papers. I shall cite a few of these authors:—Influenza “developed renal disease” (Soltau); “Albumin present in 100 per cent. of cases,” “Albumin continued to be present over a longer period,” “Patients returned to duty only to relapse with œdema of the eyelids” (Whittingham and Sims); “The urine not free from casts although the temperature has been normal for some days” (Symonds). These observations confirm the view that the acute nephritis, which, as we all know, very often sets in with influenzal pneumonia, can also continue after the influenza itself has come to an end. I shall now report our experience in this matter.

In 267 cases where the result of this examination has been noted, we found no albumin in 84 cases—a fairly large proportion of the total number. When albumin was present it was, in general, only in very small quantities (“traces”).

On microscopical examination of cases with albumin in the urine we found granular casts in 64 cases, and red blood corpuscles in 15—no sediment in 70 cases. It seems to me remarkable that we observed so many cases of influenzal pneumonia without albumin, and amongst those which had albumin so many free from sediment. This fact is the more remarkable because the mortality of these cases here, as everywhere, was very great, which shows how severe they were.

The most remarkable fact in our experience was, however, that the *albumin* in our cases *disappeared very soon*, as a rule some days before the fever, and in nearly every case not later than the fever. I shall now describe in a few words the cases that form exceptions to these two rules, *i.e.*, where the albumin ceased later than the fever, and the urine showed more than traces of albumin.

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CASE I.—Widely extended pneumonia of both lungs; for some days I was almost certain the patient must die; he had traces of albumin which continued four days after the fever had disappeared. Thereafter no symptoms of renal disease, and patient quite healthy. (1918: No. 1443.)

CASE II.—14 pro mille albumin; no later analysis as patient was confused, and the urine could not be collected; many granular casts. Patient died. (1918: No. 1353.)

CASE III.—7 pro mille albumin; no sediment; free from albumin three days before the fever ceased. (1918: No. 1427.)

CASE IV.—10 pro mille albumin two days before death, but the last days only 0.1 pro mille; granular casts; death supervened in a condition of collapse; severe cyanosis; fever to the last only 101° F. The necropsy showed only slight degeneration of the kidneys. (1918: No. 1497.)

CASE V.—5 pro mille albumin, some granular casts; after only a few days free from fever and albumin. (1918: No. 1498.)

CASE VI.—5 pro mille albumin; patient died; albumin diminished and on the last day only traces of albumin, but still great number of granular casts. (1918: No. 1504.)

CASE VII.—3.5 pro mille albumin, very severe case; cyanosis very acute and lasting a long time; albumin quickly diminished; later free from albumin; few granular casts; fever continued for a long time (empyema). (1918: No. 1522.)

CASE VIII.—0.2 pro mille albumin; patient died; no sediment. (1918: No. 1841.)

CASE IX.—1 pro mille albumin; no sediment; free from albumin one month before fever disappeared. (1919: No. 19.)

CASE X.—12 pro mille albumin; free from albumin one week before fever disappeared; at first many granular casts, later no sediment. (1919: No. 58.)

CASE XI.—12 pro mille albumin; albumin disappeared at the same time as the fever; few granular casts. (1919: No. 60.)

CASE XII.—2 pro mille albumin; few granular casts and red blood corpuscles; died later of empyema; free from albumin before death occurred. (1919: No. 69.)

CASE XIII.—6 pro mille albumin; free from albumin ten days before the fever disappeared; no sediment. (1919: No. 123.)

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CASE XIV.—0.7 pro mille albumin during three days before death ; some granular casts. (1919: No. 391.)

CASE XV.—4 pro mille albumin ; red blood corpuscles ; free from albumin one week before fever ceased. (1919: No. 514.)

CASE XVI.—0.5 pro mille albumin ; no sediment ; free from albumin two days before the fever disappeared. (1919: No. 627.)

CASE XVII.—0.1 pro mille albumin ; no sediment ; died three days later ; no examination during these days. (1919: No. 656.)

CASE XVIII.—Outside the hospital I saw one very severe case, with 12 pro mille albumin, many granular casts, also red blood corpuscles. Death seemed to me almost certain, but a distinct improvement set in after an injection of serum (*vide post*). In this case, however, 12 per cent. albumin remained after the fever had disappeared. A malignant affection of the kidneys seemed to me at that time probable, but the albumin diminished very quickly, and after a few days the patient was free from albumin and was also otherwise healthy.

CASE XIX.—Finally, I saw a case of influenzal pneumonia (1919: No. 14) in the case of a patient who had suffered for many (18) years from chronic interstitial nephritis, and who had been treated in hospital four years previously for that disease. At 12 years of age patient had had scarlet fever, at 15 headache and vomiting from which she has suffered ever since. On admission to hospital, 1915 (the albumin only discovered immediately before admission), patient had 0.9 pro mille albumin and few granular casts. Later only 0.1 to 0.2 pro mille and no sediment. Blood-pressure 175 mm. Hypertrophy of left ventricle. She had at first, during the pneumonia, 2 pro mille albumin and some granular casts ; later, there was no sediment, and we did not find that the nephritis had been increased by the pneumonia. (Albumin 0.3 pro mille, blood-pressure 150 mm.)

In view of the above cases I have formulated two rules regarding the occurrence of albumin in influenzal pneumonia ; (1) that albumin in general occurs only in small quantities, and (2) that it soon disappears. From the former rule we see that there are some exceptions, but from the latter I have only observed two (Nos. 1 and 18). My observations show that in some cases a large quantity of albumin was present a few days after the beginning of the fever ; it diminished regularly, however, in a very short time. When the patient survived the disease the albumin disappeared not later than the fever (with

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two exceptions), but even when the disease ended in death in cases where the quantity of albumin had been great it had either rapidly diminished before death occurred, or else had quite disappeared, as in No. 12. In this case, however, death was caused by a complication.

In my whole experience my observations have always led to the same conclusion, *i.e.*, that *the renal affection in influenzal pneumonia*—which is certainly very frequent—*is not severe*, and even in the cases where a great quantity of albumin occurred we have been forced to the conclusion that the renal affection is, nevertheless, of a benign character. Indeed, in none of the many fatal cases have I found reason to believe that the renal lesion had any importance for the issue. Also, the fact that I have seen a case of chronic nephritis pass through pneumonia without any aggravation of the renal affection (No. 19) strongly favours the view that the renal affection in influenzal pneumonia is of a benign nature only.

The conclusions which I formed from my clinical observations are in accordance with the results of the necropsies obtained by Sjoëvall (Lund). He found that the kidneys in general showed only a moderate degree of parenchymatous degeneration; in one case only did he find a slight glomerulo-nephritis. My observations also included a case of chronic nephritis which passed through influenzal pneumonia without any aggravation of the symptoms, and this observation is in line with the fact that pathologists have not seen many cases of chronic nephritis at the necropsies of influenzal pneumonia. In comparing this finding with that of the heart affections the difference is very striking: Sjoëvall, in 176 necropsies of cases of influenzal pneumonia, found 20 cases of chronic valvular disease, especially mitral stenosis, and his experience corresponds with that of many other authors.

The conclusions to be drawn from these results of our observations are evident:—

The presence of chronic valvular disease is very dangerous when influenzal pneumonia sets in, but the effect of disease of the kidneys, even on kidneys already suffering from chronic nephritis, is not very marked.

As may be seen, the result at which I have arrived through the analysis of my observations is not in agreement with the opinion expressed by the authors above cited. In regard to this I can only say that my experience of such cases has been large, has been quite uniform, and has been consistent for

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the whole time of the epidemic. All authors are agreed that the renal affection in influenzal pneumonia, as in most other acute infectious diseases, is due to a toxic effect, and I must conclude that my experience as to the slight or, at least, benign affection of the kidneys indicates that the toxic condition in influenzal pneumonia is not very severe. I am quite aware that this opinion is not in agreement with that of many authors, but the reasons for my belief seem to me to be well established. Yet I cannot exclude the possibility that the toxic effect in influenzal pneumonia, though not very severe on the kidneys, has a more powerful influence on some of the other organs.

(To be continued.)

PELLAGRA.*

By FRANCIS D. BOYD, M.D.

PELLAGRA is a disease which is of enormous importance from an economic standpoint to Italy, Spain, the Middle East, Lower Egypt, Northern China, and other parts of the world. It is estimated that in Roumania alone as many as 100,000 cases of Pellagra have occurred in one year. It is because one is convinced that there are far more cases in Great Britain than is generally recognised that one ventures to bring the subject before the Society.

When acting as Consulting Physician for the Egyptian Expeditionary Force I was associated with Lt.-Col. Lelean R.A.M.C., in an inquiry into the health of the Turkish prisoners of war. We were fortunate in having a strong team of collaborators—Dr Wilson, Professor of Physiology in the University of Cairo, Major Ferguson, Professor of Pathology, Captain Roaf (Bio-Chemistry), Dr Woodcock (Proto-zoology), Captain Campbell, Captain Paton (Pathology and Bacteriology).

We found that Pellagra was very prevalent amongst the Turkish prisoners—in November 1918 over 1500 cases being admitted to hospital in the month.

The characteristic early clinical features of the disease are pigmentation and dryness of the skin. The pigmentation and dryness were first noticeable on the backs of the hands and on the face. On the face, commencing on the nose, it spread out over the cheek in a batwing-like outline. There was a band of pigmentation round the neck and extending down the sternum like a cravat. The dorsum of the feet showed pigmentation and dryness. Any points of pressure, as where a belt or garter had been worn, showed pigmentation, and any scars were deeply pigmented. In the acute cases the pigmentation passed to erythema, and even to ulceration. The back of the hands would appear raw and deep cracks developed.

Digestive disturbance was a prominent feature. There was complaint, as a rule, of burning and discomfort after food. The tongue was characteristic. At first somewhat furred, it rapidly lost the epithelium and had the appearance of moist, raw meat.

* Communicated to the Medico-Chirurgical Society of Edinburgh, 5th November 1919.

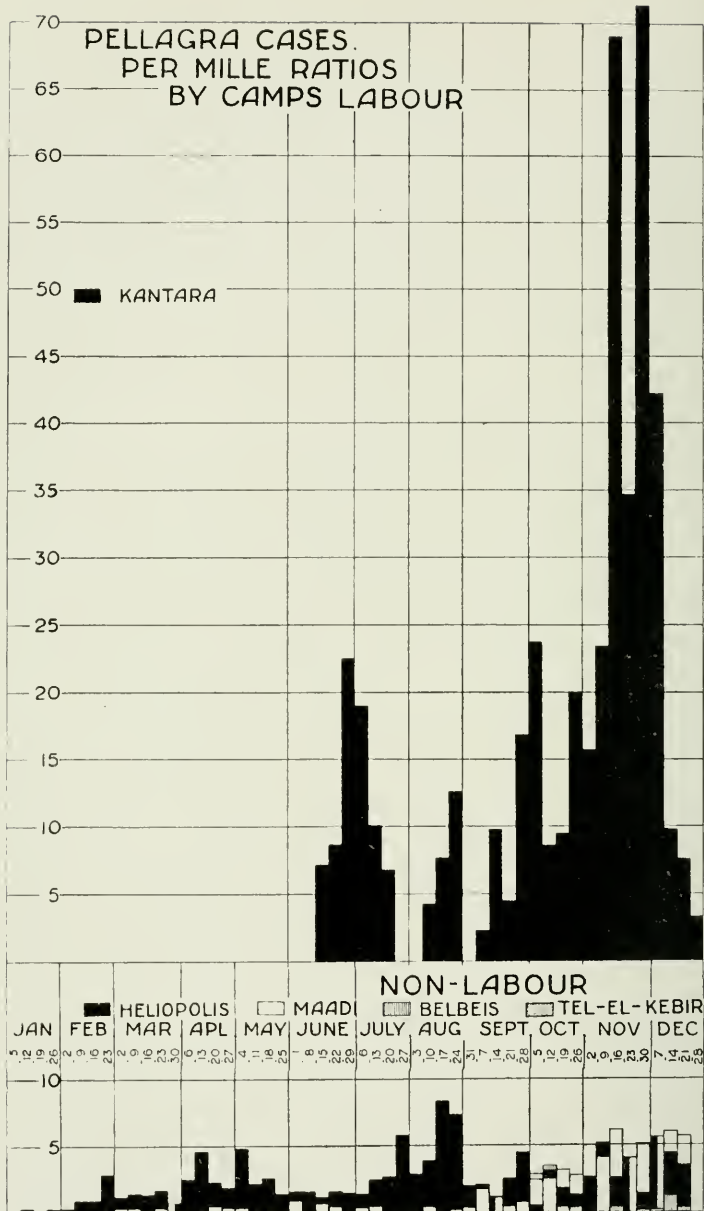


FIG. I.

Pellagra

Early in the disease the hydrochloric acid of the stomach was diminished, to become completely lost in the fully developed clinical picture. Diarrhœa was constant. The stools were markedly offensive. A total of 220 stools of pellagrous cases were examined. They contained flagellates in enormous numbers; *B. Dysenteriae* and *Entamœba histolytica*. Helminthic infection was exceedingly prevalent, but careful bacteriological study revealed no micro-organisms which could be held as definite causal factors of the disease.

As was natural, nutrition suffered early in the disease. At first when there was very mild pigmentation of the hands and the face the individual could be classified as a "strong man," but after three weeks it would be noted that nutrition had begun to suffer—first noticeable, apparently, in the muscles of the upper arm and shoulder-girdle.

In no case of uncomplicated pellagra was there any fever present.

Observations of the blood-pressure were of interest. The normal Turkish prisoner of war on camp diet showed a systolic pressure of 125. Very early in the disease a fall of blood-pressure took place. Those with slight pigmentation but still graded as "strong men" gave a blood-pressure of 119. When the disease could be definitely diagnosed the blood-pressure was found to fall, on an average, to ninety-two. In acute cases it might be found as low as seventy-eight, and it was noticeable that the fall in blood-pressure was in no way proportionate to the loss in nutrition.

Nervous phenomena were a prominent feature of the fully developed disease. On entering a ward or camp, with a little experience you could recognise a pellagrous patient by his depressed and dejected appearance. Cerebration became very slow. The individual took no interest in his surroundings. At first the deep reflexes were diminished, later on in the disease exaggerated, to be finally lost when muscle tonus became finally depressed. In no case was there any interference with sensory functions. Common sensation, sensation of heat and cold, vibration sensation, all were maintained, thus, apparently, excluding beri-beri as a possible diagnosis.

A glance at Diagram 1 will show that the principal seat of the outbreak was the Labour Camp at Kantara. Was there anything in the Labour Camp which is to be considered an *etiological* factor in the disease? Sanitation was as perfect

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as is compatible with camp life. Sanitary defects can thus be put out of court. The water supply was examined and found to compare favourably in content of micro-organisms with the water supply of many home districts. The water was examined for colloidal aluminium and colloidal silicon. None was found.

A map of the camp was drawn up, of the case incidence in different tents, to consider the possibility of case-to-case infection, but the mathematical result showed that there was absolutely no evidence of such infection.

Metabolic observations were carried out on a large scale. It was found that in the pellagrous there was a considerable loss of protein by the bowel. This was accounted for (1) by loss of appetite, (2) by deficient secretion of hydrochloric acid. Deficient secretion of hydrochloric acid is followed inevitably by deficient pancreatic secretion. There is thus deficient assimilation of protein. Deficient secretion of hydrochloric acid permits of the invasion of the bowel by micro-organisms, under whose influence the protein of the food is destroyed by putrefactive decomposition. In addition to this there was loss of protein by diarrhœa.

The destructive effect of micro-organisms on the food is well seen by the work of Captain Roaf, which showed that as the clinical picture developed the proportion of indican in the urine rose, to diminish again as the attack subsided.

A very large number of observations were carried out on the blood, urine, and cerebro-spinal fluid. No specific micro-organisms, no protozoa, no spirochætes or ultra-microscopic organisms could be found after the most elaborate search. The blood showed a chlorotic type of anæmia. In none of the cases, except where there was a secondary infection such as malaria, was there any increase in the large mono-nuclear cells of the blood—a point of some importance when considering the possibility of a protozoan infection being accountable for the disease.

Metabolic observations were carried out on the apparently healthy prisoners who were specially selected on account of their good physique and apparent absence of any pellagrous phenomena, and it is interesting to note that these individuals were apparently in a pre-pellagrous stage, for there was a very definite actual loss of protein and fat by the bowel far in excess of what was to be anticipated.

DIETETIC VALUES re PELLAGRA

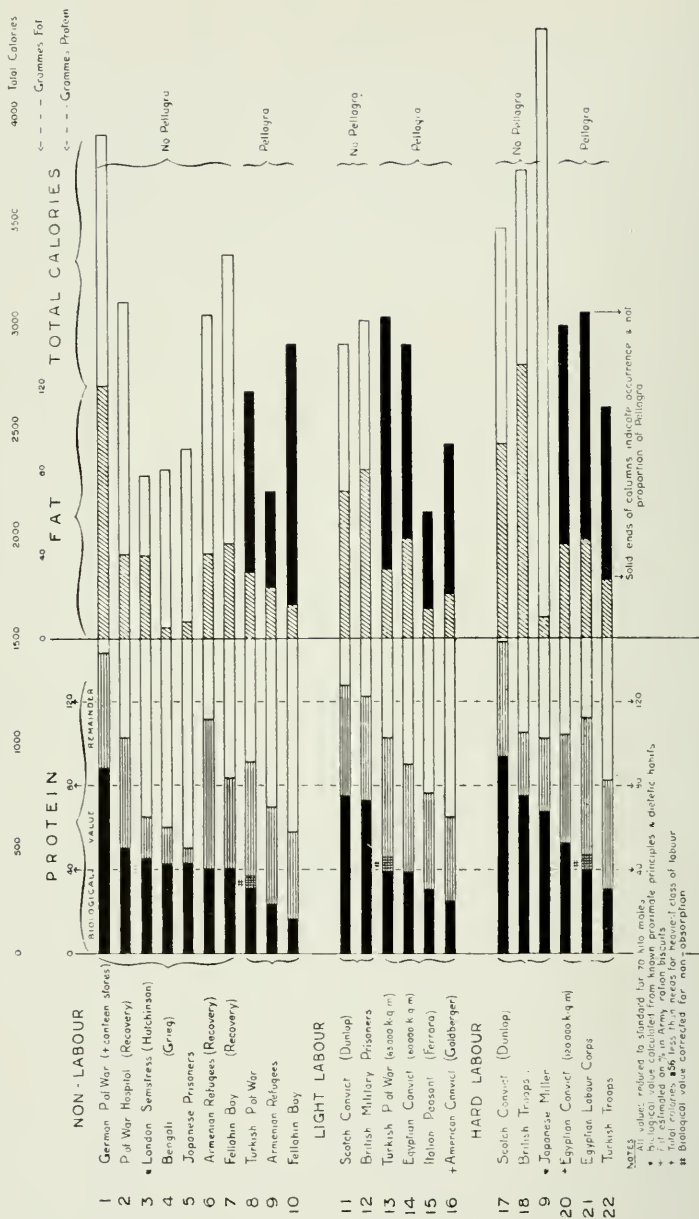


FIG. 2.

Pellagra

Loss of Protein and Fat by the Bowel.

	Anticipated Loss.	Pre- pellagrous.	Pellagrous.
	Per cent.	Per cent.	Per cent.
Protein . . .	23	33	35
Fat . . .	10	19	28

So far, then, the inquiry had led to no definite conclusion as to why these Turkish prisoners had become pellagrous. It was only when the condition was examined from the point of view of a deficiency disease that some light seemed to be thrown upon the outbreak.

It was formerly the habit to consider dietetic values in calories—now we know that the protein of diet is only of value in the building up and repair of the body in so far as it contains certain essential amino-acids. The richness of the protein in these essential amino-acids can be calculated, and we speak then of the biological value of protein.

The table shows the smallest amount of protein which is necessary to protect a man of 70 kilos from a loss of body protein.

Protein Source.	Smallest amount protect- ing a man of 70 kilos from Loss of Body Protein.	Biological Value.
Meat	30 grams a day	1.000
Milk	31 " "	0.965
Rice	34 " "	0.880
Beans	50 " "	0.600
Bread	76 " "	0.395
Maize	102 " "	0.293

From the table it will be seen how low the biological value of maize stands.

Fig. 2 was drawn up for the comparison of a large number of diets bearing on a possible occurrence of pellagra under varying conditions. The table shows the total caloric value of the diet, the amount of protein, fat, and carbohydrate constituents of the diet, and, in addition, the biological value of the protein. The solid ends of the columns indicate the occurrence of pellagra.

The table indicates, *firstly*, that the total caloric value of the diet bears no relation to the occurrence of pellagra. Diets 3, 4, 5, 13, 20, 21.

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Secondly, that there is no relation between fat deficiency and the occurrence of pellagra. Diets 4, 5, 14, 19, 20, 21.

Thirdly, that the amount of total protein does not bear any relation to the occurrence of pellagra. The total protein may be small in amount and no pellagra may occur, and again pellagra may occur when the total protein is present in average quantity. Diets 3, 4, 5, 13, 20, 21.

Fourthly, the table seems to show that pellagra occurs whenever the biological protein of the diet falls below 40 grams.

The Turkish prisoners had been in a condition of semi-starvation before capture. A large proportion of them were in a pre-pellagrous or pellagrous stage when captured. They were losing protein by the bowel, by non-absorption, and by bacterial decomposition. As the diagram shows, if consideration be given to the protein loss, the diet of the Turkish prisoner was ample and generous as considered by caloric values, yet, in its content of biological protein, falls just below the standard. Add to that the element of labour, and you seem to arrive at the explanation of how the outbreak of pellagra was so prevalent in the Labour Camp as compared with the mere detention camps at other places.

Diagram 3 is of some interest. It may be remembered that in 1915 a number of Armenians who had put up a fight and taken to the hills with their families, were rescued by some French warships. They were taken to Port Said and housed in a camp. Their diet was arranged on the supposition that the men would work and supplement their diet from their earnings. Work, however, did not seem to attract the refugees, and they subsisted on a diet which was poor in biological protein. After six months of this diet, pellagra made its appearance and rapidly increased. In July the men were induced to work, and with their wages were able to supplement the diet, and pellagra slightly diminished. From September to October the incidence of pellagra was fairly constant. In October the authorities further supplemented the diet, and it will be noted that pellagra rapidly diminished, to disappear entirely when the biological value of the protein of the diet was further increased.

Dietetic experiments were carried out on an extensive scale in hospital. Control cases were placed on an ordinary diet, and it was found that the average gain in weight over the

PELLAGRA INCIDENCE AND BIOLOGICAL VALUE OF PROTEIN (ARMENIAN REFUGEES)

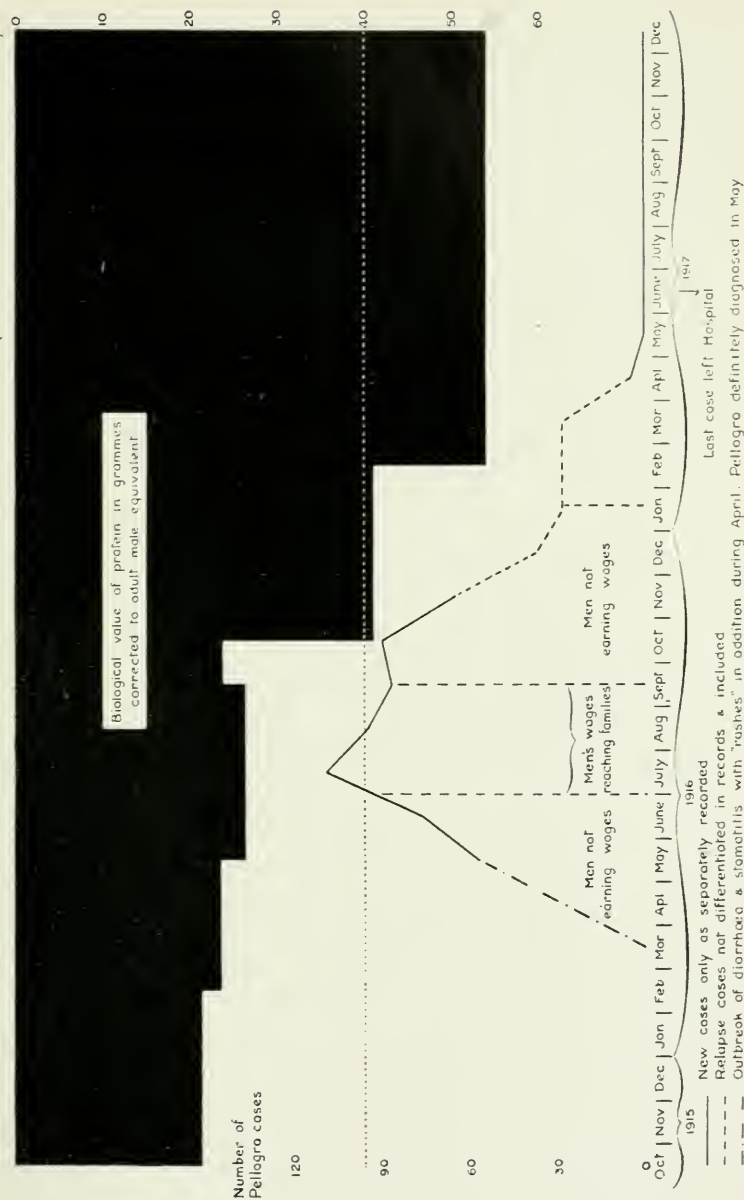


FIG. 3.



Pellagra

period was 1 lb. A second series of cases were placed on ordinary diet plus extra fat in the shape of butter. These cases gained on an average 2.2 lb. in the period. A further series of cases were placed on ordinary diet plus increased vegetable protein in the shape of beans, and gained on an average over the period 7 lb. in weight.

From these observations it seems justifiable to conclude that there is a definite relation between the biological protein of the diet and the occurrence of pellagra.

Working on the lines of biological protein, in November a recommendation was made suggesting the increase of the biological protein in the diet of the prisoners of war and the stopping of work in the camp at Kantara. These recommendations, as will be seen from Diagram 1, were rapidly followed by a fall in the case incidence, so that by the end of December the admissions from the Kantara Camp had fallen to 2.5 per mille.

The morbid anatomy of the disease was unsatisfactory. A large number of post-mortem examinations were carried through, but in every case the morbid phenomena were obscured by intercurrent infection. In a series of 100 deaths there were only two which were unexpected and in which the writer was not able to determine that the individual was dying from an intercurrent infection such as Dysentery, Malaria, Relapsing fever, etc. This intercurrent infection naturally obscured and confused the morbid findings due to pellagra.

In conclusion one would urge (1) that the clinical features of the disease are those of a profound suprarenal inadequacy; (2) that there is no evidence from the clinical and pathological findings of any specific protozoan or bacterial infection; (3) that digestive disturbance accompanied by defective secretion of hydrochloric acid leads to disturbance of pancreatic functions, defective digestion, and mal-assimilation of protein and fat; (4) that there appears to be an intimate connection between the proportion of biological protein in the diet and pellagra. The relation between maize and pellagra appears to be due not to any toxic properties inherent in maize, but to the poverty of maize in biological protein. (5) The disease produces a loss of resistance to the invasion of bacterial and protozoan disease, and is therefore a contributory factor to a very high rate of mortality.

ADENO-SARCOMATOUS TUMOURS OF THE KIDNEY: A CLINICO-PATHOLOGICAL STUDY.*

By JOHN FRASER, M.D., F.R.C.S.

DURING the first five or six years of life, tumours of the kidney are uncommon, but if a renal tumour makes its appearance during this period, it is most likely to be of the type which has been called the "mixed tumour" or the "adeno-sarcoma."

Since November 1917, over a period that is to say of practically two and a half years, I have seen at the Children's Hospital seven examples of kidney tumours, and all of them have been of the type of the so-called "mixed tumour." It must therefore be looked upon as a rare condition, as, during this period, some 15,000 new cases have passed under review.

Age Incidence.—The youngest child of the series showed evidence of the tumour formation in its right kidney when it was one month old. It was five months old when it received treatment. The oldest child of the series was six and a quarter years old. Of the intervening cases, two were between one and two years of age, one was two and a half years, and two were between three and four years. It is interesting to notice that though the Hospital admits patients up to the age of twelve years, no instance of tumour formation occurred at a later age than six and a half years.

In order to lead this point to a fuller conclusion, I have gone over the Hospital records for the past twenty years, bringing under review some 85,000 children, and in no instance have I found record of a tumour formation of this description at a later date than seven years. The tumours, therefore, have made their appearance at some period during the first seven years of life.

This peculiarity of the age incidence is borne out by the published statistics of writers who have had a vastly greater experience than I can claim. Albarran and Imbert¹ have recorded an analysis of 165 cases. Of this number, 152 occurred during the first seven years. Stiffen's² statistics included 213 cases. 203 of these occurred during the first seven years of life.

It is not intended to infer that cases do not occur during

* The pathological work of this investigation has been carried out at the Laboratory of the Royal College of Physicians.



FIG. 1.

A child, 18 months old, suffering from a large adeno-sarcomatous tumour of the left kidney.

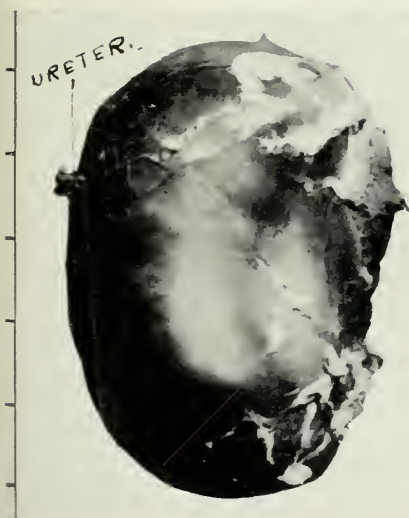


FIG. 2.

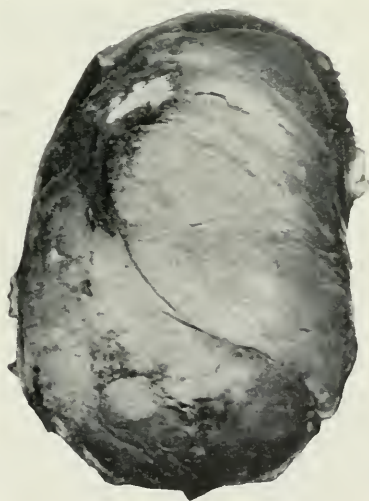


FIG. 3.

Figs. 2 and 3.—The appearance of the tumour. Fig. 3 represents the tumour on section. Note in Fig. 2 the attachment of the ureter, and the absence of the pelvis of the kidney.

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later childhood, adolescence, or even later adult life. Various observers have recorded cases at eighteen years (Horsholt³), thirty-four years (Muus⁴ and Marchand⁵), thirty-five years (Kocher and Langham⁶), forty-three years (Jenckel⁷), and fifty-seven years (Busse⁸). But while accepting these as true examples of embryonic renal tumours, it is none the less certain that by far the greatest proportion occur during the first seven years.

Question of Sex and Side affected.—There is no distinctive feature as regards sex, male and female occur in very equable proportions. Nor is there any special importance as regards the side affected.

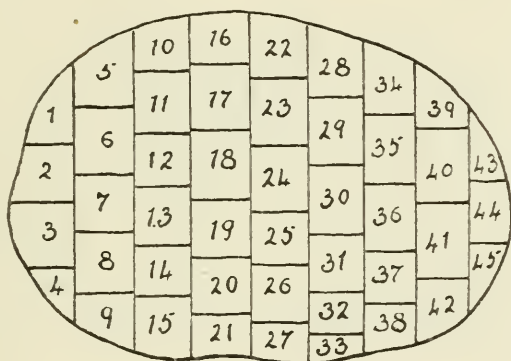


FIG. 4.

This illustrates the method of investigation of the tumour—the numbered "block" model of the tumour.

The bilateral cases are interesting. A single example is included in the present series. The question arises as to whether both kidneys are attacked independently, or whether the disease has been primarily in one kidney and the second has been involved by metastasis. I confess I am unable to state which of these possibilities is the correct one.

The Clinical History.—The clinical histories recorded in the cases which came under observation may be summarised somewhat as follows:—

While the child is well nourished, active, and apparently healthy, a gradual increase in size of the abdomen is noticed. Coincident with this observation, it is generally recognised that the child is beginning to suffer from an increasing tendency to constipation. The abdominal swelling increases slowly but

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steadily, and cathartic medicines are resorted to in order to overcome the constipation. Then, and most frequently by chance, a local tumour formation is discovered in the region of the kidney. When the discovery is made, medical advice is usually sought, but in many cases the child's general well-being is so deceptive as to lead the parents to believe that nothing very serious is at fault, and further delay is encouraged. With comparative suddenness the clinical features alter. The abdominal swelling rapidly increases in size, the surface veins of the abdomen become prominent, the constipation is more persistent, there may be recurrent attacks of vomiting, and, what is the most distinctive of the late features, the child rapidly begins to lose flesh and weight. If medical advice has not been sought earlier, it is almost certainly obtained at this stage.

I would especially draw attention to the fact that no urinary symptoms (excluding the tumour formation) have been apparent. There has been no alteration in the act of micturition, and nothing abnormal has been noticed in regard to the urine. To this statement I would add a single qualification. In one of the cases there was a history that about one year before any serious symptoms appeared, a temporary hæmaturia made its appearance. This observation was made by a medical man, and I see no reason to question its accuracy. It was a very temporary feature, lasting for about five days. It entirely disappeared, and there was no reappearance of this feature in the subsequent history of the case. I believe that importance should be attached to this feature, and I shall reconsider its significance later.

If the tumour formation remains unrecognised or untreated, the subsequent history is that of a rapidly fatal disease. The abdominal swelling continues to increase, fluid appears in the abdomen, and secondary tumour formation can be recognised. The lower limbs become œdematous as the result of venous pressure, the general body wasting becomes more marked, and it is all the more striking when contrasted with the abdominal tumidity. Death ensues as the result of cachexia, of some intercurrent disease such as broncho-pneumonia, or of a metastatic growth in a vital region.

An Analysis of the Clinical Features.—There are certain points in the clinical history of these cases which demand a closer attention.

A. The General Outlines of the History.—The child does not

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show signs of general disturbance from the commencement of the disease. In the early stages of the tumour formation, and up to a point when the growth may have attained a considerable size, the child remains in excellent health and condition, if one excludes the occurrence of constipation. After a certain stage is so reached the picture entirely alters, and the child very rapidly goes down hill.

This sequence of events is characteristic and striking. It is entirely in keeping with what one learns from a study of the pathology of the disease. I draw attention to it now from the clinical standpoint, and I shall attempt to explain it when I deal with the pathological changes.

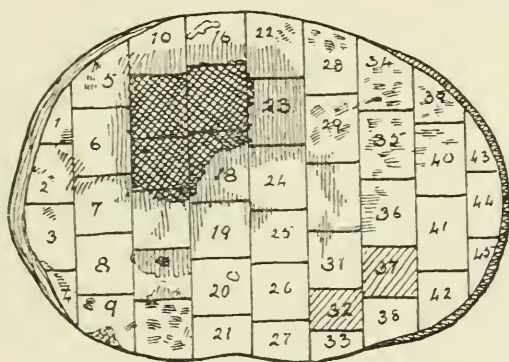


FIG. 5.

A reconstructive view of one of the planes of the tumour.

B. The Absence of Urinary Symptoms and Signs, more especially the Absence of Hæmaturia.—I have already alluded to the possibility of early temporary hæmaturia, and I shall elaborate this point later ; but omitting this point, it is surely a most remarkable feature that in a tumour of the kidney—it may be of great size—there is an entire absence of any abnormality in the urine. I am aware that the majority of text-books state that hæmaturia is a characteristic feature of the disease, but I can only say that in the cases which came under my observation a most careful examination of the urine was made, and in no case was any abnormal constituent found to be present. When I discuss this point in the light of the pathological evidence, I believe that I shall be able to show that one would be extremely surprised to find any change present in the urine as it is passed “per meatum.”

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C. Subsidiary Features.—There are other features in the clinical history which are interesting, but none of these possess the significance of the two which I have mentioned.

One is impressed by the comparatively “silent” nature of the tumour formation. Even in a well-established case when the size of the growth is so great as to occupy a considerable portion of the space in the abdominal cavity, the symptoms are remarkably few. Pain, for example, is very rarely complained of, and when it appears it is generally found to be due to colic. The constipation is perhaps the most insistent feature, and its occurrence is not difficult to explain. It results from a displacement of the colon, and from a stripping of the large bowel from its attachments to the posterior abdominal wall.

I shall have occasion to refer again to the various clinical features when I have dealt with the pathology of the tumour. In the light of the pathological evidence many of the apparent obscurities are cleared up.

Some Pathological Considerations—*The Relations and Naked Eye Appearances of the Tumour.*—When the abdomen is opened in one of these cases, the tumour appears as a rounded, bluish mass, filling up one side of the abdominal cavity. Usually the surface of the tumour is smooth, but in the advanced stages, knob-like irregularities appear on the surface. These are of extreme importance from the point of view of prognosis, as I shall show later.

The consistence of the growth is either firm or soft, firm if the tumour is a solid one, and soft if degenerative changes have taken place within it.

Resulting Displacements.—The overlying tissues are displaced in a definite relationship, the colon where it passes over the tumour is displaced forwards and medially, the small intestine is carried towards the opposite side from the tumour. The duodeno-jejunal junction may be considerably altered in position if the tumour reaches any great size. In one instance I found that the junction, together with the third portion of the duodenum, was completely loosened from its posterior attachment, with the result that the ligament of Treitz acted as a suspender, and so gave rise to a marked degree of kinking at this portion of the bowel. In this case, sickness had been a noticeable feature in the clinical history, and I have no doubt that it owed its origin to this displacement.

When the tumour originates on the right side, the second

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portion of the duodenum shows a considerable displacement towards the middle line. The blood supply of the bowel is sometimes interfered with, the veins to a greater extent than the arteries. The inferior mesenteric vein may be displaced to such an extent that there is considerable interference with the return of blood along this channel.

Appearance on Section.—On section the tumour is greyish, white, or yellow in colour, and if hæmorrhage has taken place within the tumour, a darker colour may be apparent.

In some instances cyst formation occurs, and these cysts are the result of previous hæmorrhage, or of degenerative changes.

Changes in the Upper End of the Ureter.—In the specimens

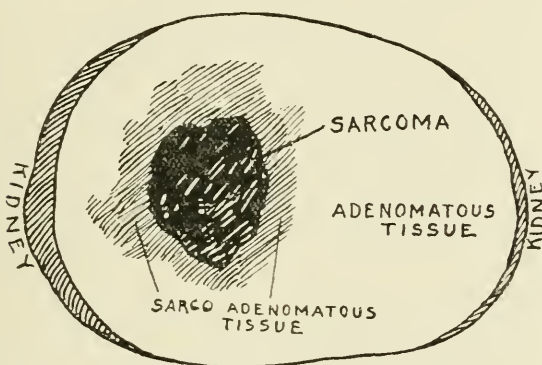


FIG. 6.

An illustration to show the distribution of the various tissues of which the tumour is composed.

which I have had an opportunity of examining, there has been this remarkable feature that no pelvis of the kidney can be made out. The quill-like ureter is attached to varying points along the mesial edge, but there is no expanded portion apparent at its upper extremity. The tissues of the ureter wall appear to be continuous with the capsule of the tumour. When the lumen of the ureter is opened and the lumen traced upwards, its upper extremity is found to be closed by the expanding mass of the tumour, and there are no traces of calyces. It is therefore only reasonable to assume that the tumour formation has no secretory functions, and that after the tumour becomes well established, no fluid passes downwards along the ureter.

Abnormality of the Blood Supply.—The striking feature of the blood supply is the meagreness of the arterial distribution.

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I, of course, have only been able to judge of this from injected specimens of the tumour; I have not had an opportunity of observing the blood supply in early specimens when the tumour formation has been localised; but allowing for this consideration, there is none the less a distinct abnormality of the arterial supply, and this has been a constant feature in all the specimens which I have examined.

The main renal artery is relatively a small tenous vessel. From it there is a distribution of blood to the poles of the tumour, while the centre of the growth is very imperfectly supplied.

I, of course, recognise that as a result of the alteration of the whole kidney contour, it is impossible to form any exact estimate as to the extent of this abnormality, yet I believe that there is a distinct error in the distribution of the arterial supply.

The renal vein is of moderate size, and its radicles are grouped in a fan-shaped arrangement throughout the tumour.

The Modern Views regarding the Origin of the Tumour.—

I do not intend to give in detail the various theories which have been brought forward from time to time in explanation of the tumour growth, but I shall summarise the modern views into three groups:—

A. It has been taught that the tumours owe their origin to inclusions of Wolffian tissue which have become displaced, and which persist among the cells of the developing kidney or metanephros.

B. There are those who believe that aberrant cells of the myotome and sclerotome are responsible for the tumour growth, and they claim that the apparent “mixed” character of the tumour is to be explained by the varying constituents which enter into the ultimate formation.

C. The third school believe that these tumours are not due to inclusions from extrarenal sources, but that they are derived from the embryonic tissue of the true kidney, the embryonic tissue persisting and becoming metamorphosed into cellular structures of varying types.

These three views are widely different in their teachings, and it was partly with a view to satisfying myself of their relative values that I undertook a detailed investigation of the pathology.

I shall therefore describe (1) the method which was followed in studying the pathological changes; (2) the results of the

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pathological investigations; (3) the deductions which one drew from the pathological findings in regard to the origin and development of the tumour.

(1) *The Method of Examination.*—It is obvious that in order to obtain a collective idea of the tumour structure, it was impossible to rely upon the examination of a few sections taken at random from the bulk of the tumour. The "block" method of examination was therefore employed. A median coronal section of the entire kidney was made in two parallel planes. A model of this was accurately made from thick paper and the tissue was subdivided into a number of blocks, as far as possible equal in size. These were numbered and their position noted

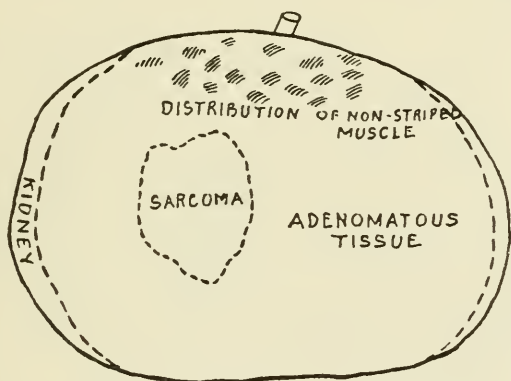


FIG. 7.

A reconstruction of the tumour to show the distribution of the non-striped muscle.

upon the accompanying model. Each block was then sectioned and examined microscopically and the appearance recorded upon the key. In this way, a microscopical picture representative of a mesial section of the entire kidney was obtained.

With this knowledge it has been possible to visualise the exact distribution of the tumour, and further, it has been possible to demonstrate any progressive changes which may be occurring.

(2) *The Results of the Pathological Investigations.*—It was apparent that at least six different tissues entered into the formation of the tumour:—(a) True renal tissue. (b) An acinar or adenomatous tissue. (c) Sarcomatous tissue. (d) Non-striped muscular tissue. (e) Connective tissue. (f) Vascular tissues.

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I shall briefly summarise the important points in regard to each of these :—

(a) *The Renal Tissue*.—True kidney tissue is distributed as a thin cap-like area upon both poles of the tumour. With the naked eye these are recognisable as distinctive from the tumour tissues, and they can be separated with ease from the main growth. Microscopically, tubules and glomeruli may be recognised, but the tissues have suffered from displacement and compression. It is obvious that these structures possess no active physiological function.

The position of the kidney at the poles of the tumour is the result of a gradual intracapsular displacement by the developing tumour tissue.

(b) *The Acinar or Adenomatous Tissue*.—With the exception of an area in the centre, the main bulk of the tumour is composed of an acinar or adenomatous tissue. The acini show a wide variety of shape and size. The lining cells are cubical or columnar, no basement membrane is apparent, and the acinar cavity contains a mucoid-like material, apparently derived from the lining cells.

The acini are arranged in a compact fashion, with a very small amount of supporting connective tissue.

The degree of vascularity is slight, and the blood-vessels which exist are primitive in structure.

The whole appearance of the tissue, the nature of the existing blood-vessels, the histological character of the acinar cells, and the structure of the inter-acinar connective tissue are convincing evidences that this portion of the tumour has been embryonic in origin.

The Probable Origin of the Adenomatous Tumour Tissue.—This is a question which very naturally arises, and without unnecessarily belabouring what most probably must remain hypothetical, I shall briefly state what appears to me to be the likely source of the origin.

In the paraxial region of the dorso-lumbar portion of the embryo, there are several embryonic structures which may conceivably have been the source from which the tumour formation originally sprung. There is this certainty, however, to work upon—the original tissue was mesoblastic in type. I say so because, as I shall presently show, the adenomatous tissue tends to revert in certain portions of the tumour to a mesoblastic tissue. For this reason, I believe one can exclude

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an epithelial formation, such as the epithelium which lines the embryonic neural canal (Busse). For the same reason, it would appear reasonable to exclude the Wolffian tissue, for I am informed that according to the most recent teaching of the embryologist, the cells of the Wolffian body are hypoblastic in origin, being derived from the cells lining the coelom.

Of the structures of mesoblastic origin, there are three possible sources—the myotome, the sclerotome, and the mesoblastic nephrogenetic cells of the metanephros or true kidney. The position of the tumour as an intrarenal growth and the acinar character of the tumour cells make it extremely unlikely that either the myotome or sclerotome are the responsible

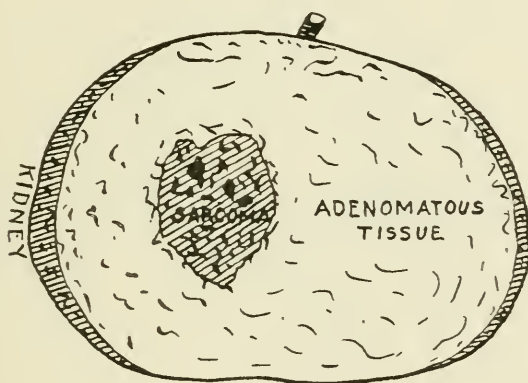


FIG. 8.

A reconstruction of the tumour to show the relative vascularity of the different areas of the tumour.

tissues. If other proofs had been wanting, one might reasonably adduce by the method of exclusion that these tumours, in so far as their adenomatous structure is concerned, have their origin in the specialised cells of the metanephros or permanent kidney. But subsidiary proofs are not entirely absent. The tumour from its earliest beginnings has been an intrarenal development, and, moreover, it has apparently been central in distribution, judging by the position of the renal tissue at the poles. Further, the adenomatous tissue, while apparently epiblastic or hypoblastic in arrangement, is certainly developed from a mesoblast source, and such a source is to be found in the mesoblastic nephrogenetic cells of the metanephros.

I believe that the reason why the nephrogenetic cells take on

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a tumour formation depends upon an error in the blood supply of the metanephros. The nephrogenetic cells, by a process which I need not detail, ultimately form the convoluted tubules. At one extremity they become united to the collecting tubules through the medium of the junctional tubules. At the other extremity, the invagination of a capillary loop into the tubule forms the future Malpighian corpuscle.

I have satisfied myself that a striking feature of the morbid anatomy is the imperfect blood supply of the affected kidney.

Further, throughout the tumour, except in the caps of true kidney tissue at each pole, there is no evidence of any attempt at the formation of glomeruli.

Therefore it seems to me that the possible sequence of events has been somewhat as follows:—The imperfect blood supply has prevented the formation of Malpighian corpuscles, the proper function of the convoluted tubules has failed to develop, and there has been a prostitution of their function, which has resulted in a tubulo-acinar tumour formation. Such is the hypothesis which I have worked out to my own satisfaction, and I realise that the best that can be said for it is that it is an hypothesis.

(c) *Sarcomatous Tissue*.—When the cut surface of the tumour is examined as a whole, it is found that the sarcomatous tissue in its most perfect state is localised to an area which roughly corresponds to the centre of the growth. Around the area of pure sarcomatous tissue there is a zone composed partly of adenomatous tissue and partly of sarcomatous tissue. In a more peripheral area there are scattered collections of sarcomatous tissue, small in extent, and quite unconnected with the central area. In fact, the distribution picture which the sarcomatous tissue shows is one of three zones:—A central area of fully developed sarcomatous tissue, an intermediate zone of adeno-sarcomatous tissue, and a peripheral zone of adenomatous tissue with a few scattered foci of sarcoma cells.

The Source of the Sarcomatous Tissue.—The sarcomatous tissue develops directly by a process of metamorphosis from the adenomatous tissue. The process may be seen in all stages. It is an interesting example of what at first appears to be a conversion of an epithelial tumour into a mesoblastic sarcomatous one, a conversion which, with our present knowledge, is generally believed to be impossible. But when one considers the origin of the tissues in both instances, one finds that the situation is by no means such an irreconcilable one, for it is

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merely the reversion of a specialised mesoblastic tissue into one of more simple type.

The original adenomatous tumour is one of low vascularity, but with the establishment of the sarcomatous change, the blood supply becomes enormously increased. The blood-vessels are of a primitive structure, being merely blood-filled spaces among the tumour cells.

From the central area, where the sarcomatous change first becomes apparent, the degeneration extends outwards in a centrifugal direction, and at varying distances towards the periphery isolated areas of sarcomatous tissue may be noted.

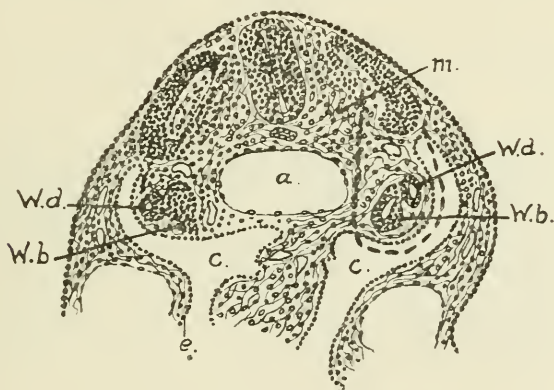


FIG. 9.

Rabbit embryo of eleventh day : after Bryce.

W.d. Wolffian duct. W.b. Wolffian body. c. Cœlom.

The area from which the tumour may conceivably develop has been enclosed in a dotted line.

Eventually nodular deposits of sarcomatous tissue make their appearance in and around the capsule of the organ, and when this stage is reached, the dissemination rapidly extends to the surrounding organs and tissues.

(d) *Non-striped Muscular Tissue*.—In the specimens which I have examined, it has not been my experience to find a widespread and general distribution of non-striped muscle, though certain observers have described such.

When a systematic "block" investigation was made of the tumour, it has been found that the non-striped muscle is limited in its occurrence to an area which roughly corresponds to the pelvis of the original kidney, that is to say, an area of the mesial

edge, about its centre. The muscular tissue is broken up into small clusters of fibres separated by varying intervals of tumour tissue, and when the tumour is remodelled on the microscopical basis, it is found that the outline of the muscular groups is that of a long pointed oval, in the shape of which a resemblance to the pelvis of the kidney may still be traced.

It would seem, therefore, that the non-striped muscle which exists in the pelvis of the kidney has been the source of a similar tissue in the renal tumour.

As the adenomatous tumour formation advances, it involves the tissues of the renal pelvis, and it has the eventual effect of breaking up the muscular ring into isolated groups of muscular fibres.

The muscular tissue is therefore not a part of the tumour formation.

(e) *The Connective Tissue*.—The whole tumour is permeated with a loose fibrillar-like network of connective tissue fibrils. In addition, there are septa of a dense nature which radiate from the position of the kidney pelvis and which tend to divide the tumour into a series of arc-like divisions. Beyond these facts, the connective tissue possesses no distinctive features.

(f) *The Blood-Vessels*.—If the tumour is examined in its early stage while the bulk of its tissue is adenomatous in structure, one is impressed by the small degree of vascularity relative to the size of the growth. The blood-vessels which exist are imperfectly developed, and even in the larger sizes the vessel walls are often composed of an endothelial lining with a thin connective tissue backing.

When the tumour undergoes a sarcomatous change, the vascular picture alters in so far as the vascularity becomes vastly increased, the smallest blood-vessels become distended to many times their original size, and there is a free formation of new vessels. The vascular change is in keeping with the rapid cell production and division which characterises the sarcomatous tissue.

The Method of Spread and Metastasis of the Tumour.—

In two cases I have had an opportunity of studying the method of dissemination of the growth. There are two ways, by either or by both of which the tumour may extend. The first and earliest method is by the blood stream, and more especially *via* the veins; it is therefore a pure metastasis. The tumour tissue which is so disseminated may consist of adenomatous or of

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sarcomatous tissue. The former occurs in the early stages of the tumour, the second in the more advanced tumour formations. The main interest, however, of the dissemination lies in the fact that whenever an adenomatous metastasis occurs, it eventually undergoes a conversion into sarcomatous tissue. This is a fact beyond all question, and it affords an additional proof of the statement which was made regarding the conversion of the adenomatous into sarcomatous tissue in the original tumour. Secondary deposits have been found in the kidney of the opposite side, in the liver, in the lungs, and in the central nervous system.

The second method of spread is by infiltration, and I believe that it is the sarcomatous tissue alone which possesses this power. Eruptions occur at varying points in the tumour

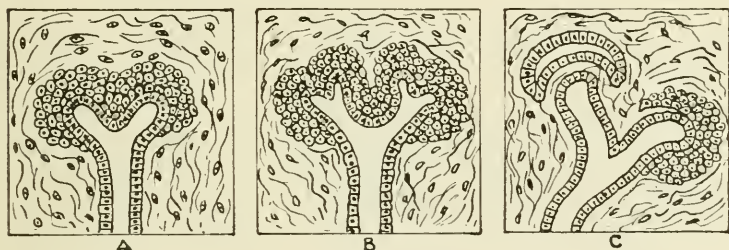


FIG. 10.

A diagram to illustrate the formation of the convoluted tubules from the mesoblastic nephrogenetic cells.

capsule, and the perinephric tissues are rapidly invaded. Deposits of tumour formation in the omentum are always sarcomatous in character, and they are not metastatic in origin but infiltrative, the omentum having been invaded at these points when it has lain in contact with the anterior surface of the tumour.

Summary of the Pathological Findings—The Origin and Development of the Tumour.—I. The tumours have been examined by the “block” method, the advantage of which has been to give a pictorial idea of the distribution of the tumour tissues, and the changes which these tissues undergo.

II. Six different varieties of tissues are met with in a tumour of a moderate degree of development:—renal tissue, adenomatous tissue, sarcomatous tissue, non-striped muscular tissue, connective tissue, and vascular tissues.

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III. The renal tissue has been gradually displaced by a tumour formation which originated within its interior, so that it eventually appears as a thin cap-like area of tissue upon both poles of the tumour.

IV. The adenomatous tissue forms the original tumour tissue. It develops within the interior of the kidney, and I believe that it originates from a group of nephrogenetic cells which, instead of developing into the tubules of the kidney, take on an erratic growth, and so give rise to the adenomatous tissue of the tumour. I further believe, though on this point I cannot show definite proof, that the origin of the erratic growth depends upon an error in the development of the renal vessels. The adenomatous tissue does not infiltrate the renal tissue, but gradually pushes it aside.

V. The sarcomatous tissue results from a metaplasia of the adenomatous tissue. The change occurs in the centre of the adenomatous tissue, and it gradually extends until the adenomatous tissue is entirely replaced by the sarcomatous formation.

VI. The non-striped muscle is derived from the muscular tissue which normally occurs in the kidney pelvis. Its distribution is limited to an area in the centre of the mesial edge, though in the more extensive growths the infiltration of the tumour tissue produces a wide separation of groups of the muscular fibres.

VII. The blood-vessels remain of a primitive structure. While the tumour is adenomatous, the degree of vascularity is small. With the development of the sarcomatous change, the vascularity greatly increases.

VIII. The tumour passes through an evolution from a tumour of low malignancy (adenomatous tissue) which remains encysted and does not infiltrate into a tumour of high malignancy (sarcomatous tissue) which grows with great rapidity and infiltrates incessantly.

The Co-relation of the Clinical and Pathological Findings.—In discussing the clinical features of these tumours, I drew attention to certain distinctive points, and I then promised to review these in the light of the pathological changes.

The General Outlines of the History.—The tumour in its beginning is an encysted one, and it is only after a certain period has elapsed that it acquires the characters of a highly malignant sarcomatous type. Therefore, one can understand

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the characteristic outline which the clinical history reveals. As long as the tumour remains of the encysted and comparatively simple type the symptoms are extraordinarily few, even though the tumour may have reached a great size.

With the appearance of the sarcomatous change the picture alters, the tumour grows more rapidly, general wasting appears, and it is at this stage that pain may make its appearance. I need hardly point out the importance of surgical interference, if possible, before the second stage makes its appearance.

The Urinary Symptoms—Hæmaturia.—It is most important to recognise that in well-established tumours of this type, blood is not present in the urine. I have used the term “well-

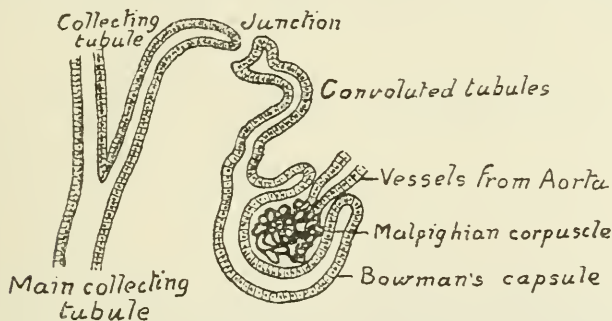


FIG. II.

A diagrammatic representation of the development of the convoluted tubules.

established tumours” because it would seem that in the early stages of the disease, probably before the kidney tumour is palpable, hæmaturia may occur. In one of the cases under review there was good evidence of its presence. What is the explanation of such a sequence? Hæmaturia is not a feature in well-established cases of the disease for the very excellent reason that no channel exists by which the blood can make its way to the surface.

In discussing the gross pathology, I described how the developing tumour leads to a disappearance of the calyces, how it obliterates the pelvis of the kidney, and eventually entirely occludes the upper end of the ureter. No channel, therefore, remains through which blood from the tumour can make its way to the surface.

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On the other hand, in the early stages of the disease, the tumour is a small one, situated in the centre of the kidney substance. Further, it is reasonable to assume that at this early stage the calyces, pelvis, and ureter are patent, and therefore any blood which may be derived from the tumour will be carried along the usual channels.

In view of these facts, I can understand that in early cases hæmaturia may be present, while in well-developed tumours it is practically a physical impossibility that such a feature could appear.

The Secretion of Urine from the Affected Kidney.—One of the most striking features in the pathological examination of a well-developed tumour is the displacement and subsequent absorption of the true kidney tissue. It is recognisable as a thin encasing area of tissue, and while the presence of glomeruli and tubules might suggest a persistence of the secretory function, it is unlikely that it has any physiological activity whatsoever. Moreover, it is cut off from the kidney, pelvis, and the upper end of the ureter by a wide area of tumour tissue which must necessarily prevent any communication between the renal tissue and the exterior. For these reasons, taken in conjunction with the feature already demonstrated, that the upper end of the ureter is unconnected with calyces and is blocked with tumour tissue, I believe that coincident with the tumour having reached a moderate degree of development, the kidney tissue on the affected side ceases entirely to functionate. Therefore, it is not surprising that examination of the urine in those cases gives a negative result, because the urine is being entirely produced by the healthy kidney.

Diagnosis.—A rapidly growing tumour in the lumbar region of a child, with symptoms of emaciation and cachexia, usually means a tumour of the kidney.

This point having been established, two factors suggest that one is dealing with an embryonic mixed tumour. These factors are:—(1) The absence of hæmaturia, except occasionally in the early stages of the disease. (2) The uniform enlargement of the whole outline of the kidney.

Certain extrarenal conditions may simulate the disease. A rapidly growing mass may be malignant disease of the retro-peritoneal glands. The tumour of the kidney has a lateral position; while the glandular mass is centrally located, and it has an area of resonance around it. Renal tuberculosis must be



FIG. 12 ($\times 60$ diam.).

The appearance of the renal tissue at the poles of the tumour. The tubular structure has been compressed beyond recognition, but the glomeruli are still apparent.

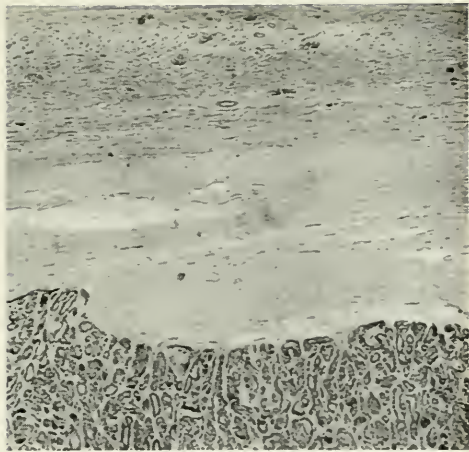


FIG. 13 ($\times 28$ diam.).

The junction between the renal tissue and the adenomatous tumour. There is no evidence of infiltration of the kidney tissue.

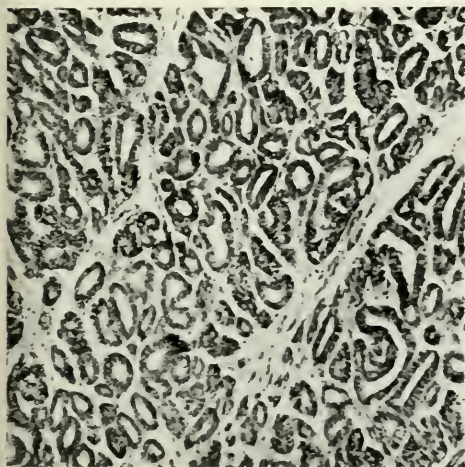


FIG. 14 ($\times 90$ diam.).

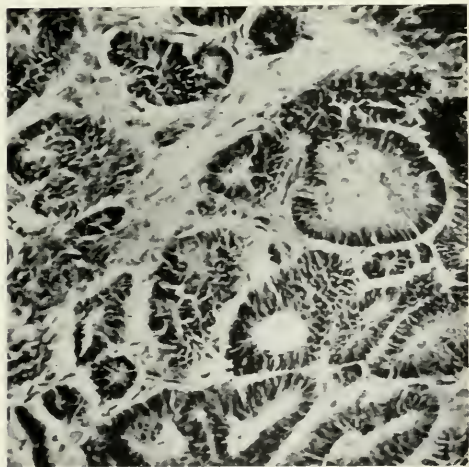


FIG. 15 ($\times 200$ diam.).

Figs. 14 and 15.—The appearance of the adenomatous portion of the tumour.

Adeno-Sarcomatous Tumours of the Kidney

thought of, but the tuberculous kidney in the child never reaches to any great size. The kidney outline is irregular, and characteristic signs are generally present in the urine.

Splenic enlargement due to leucæmia, syphilis, and malaria will have to be differentiated. It is well to remember that the anterior border of the spleen is sharp, that there is no zone of tympany between the tumour and the spinal column, and that the colon does not pass in front of the spleen. An examination of the blood will frequently lead to the correct diagnosis.

Hydronephrosis is very rare in children. It develops slowly, and it rarely reaches the large size of renal growths. Sudden changes in the size may occur in the case of a hydronephrosis.

Ovarian tumours are so rare in children that they may be practically disregarded, and the same is true of echinococcus.

Tumours of the liver are rare in children. In such cases jaundice is likely to be present, but one must be careful that a tumour of the right side under the ribs, accompanied by jaundice, is not a renal growth which has compressed the bile ducts. In liver enlargements the anterior border is distinctive in so far as it is well marked and extends in a lateral line across the abdomen.

Tuberculous peritonitis is sometimes difficult to differentiate; the presence of fluid in the abdomen is possible with both diseases. The family history may be of assistance, and so likewise the occurrence of tuberculous foci in some other part of the child's body.

Treatment.—Some years ago operation was not recommended for tumours of this description, the operation mortality was so great and the risk of recurrence so considerable. In later years, with a better and earlier selection of cases, the mortality from the operation has been very much reduced. Operative interference, of course, offers the only possible chance of recovery.

Without exception the transperitoneal route has been used, and the vertical Langenbeck incision has been preferred to the transverse one. In the cases which have come under observation, the lumbar route was impracticable on account of the size of the tumour.

The operations were performed in the Trendelenburg position. It gives great assistance in exposure of the field, and by conserving the blood in the vital organs of the body, it tends to diminish the degree of post-operative shock.

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In operating on children, the conservation of blood is a most important detail, and in no operation is this necessity more evidenced than in the procedure we are describing. Every effort should be made, therefore, to avoid the loss of blood by the free use of artery forceps, etc.

After the abdomen is opened and the overlying viscera displaced, the peritoneum over the tumour to the outer side of the colon is incised and stripped inwards, the bowel being carried with it.

When operating on the right side of the body, care must be exercised in separating the duodenum from the anterior surface of the tumour; it adheres more closely than the peritoneum, and the thin walled bowel may be torn. It is generally an easy matter now to shell the tumour out of the bed in which it is lying. The vessels are clamped, ligatured, and divided. Lifting up the tumour, the ureter is followed downwards for some distance and divided at as low a level as possible. The retro-peritoneal space is shut off by suturing the divided parietal peritoneum. Care must be bestowed on the suturing of the abdominal wound. In small children the healing of such an extensive wound is weak and delayed. If continuous deep catgut sutures are used, therefore, they ought to be reinforced by interrupted through and through sutures of silk-worm gut, threaded superficially on pieces of thin rubber tubing to prevent "cutting in" of the stitch.

Careful treatment is demanded of the post-operative shock which necessarily results. Active stimulation will probably be necessary, and an inclined position should be maintained until the shock has passed away.

Prognosis and Results.—Any evidence of secondary infection naturally renders operative interference out of the question.

Evidence of irregularity or nodulation of the outline of the tumour adversely affects the prognosis. Stated in pathological terms, nodulation means that the sarcomatous change in the interior has begun to make its way by various eruptions on to the surface of the tumour, and such a development naturally involves a very grave prognosis.

Wasting and loss of body weight are general evidences which are easily appreciated. They must be taken to mean a sarcomatous change in the tumour, and they therefore indicate that the future outlook is serious.

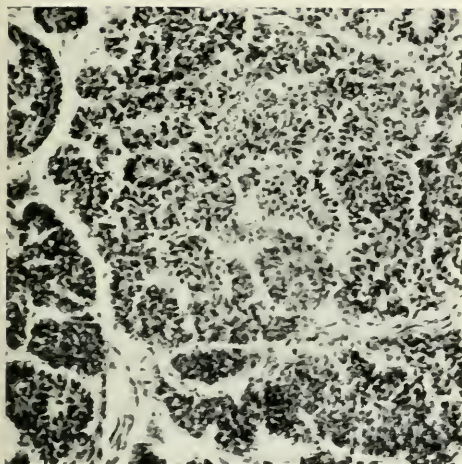


FIG. 16 ($\times 200$ diam.).

The appearance of the adeno-sarcomatous portion of the tumour.

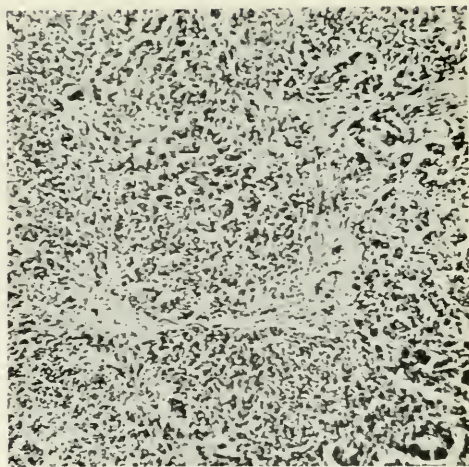


FIG. 17 ($\times 90$ diam.).

The sarcomatous tissue from the centre of the tumour.

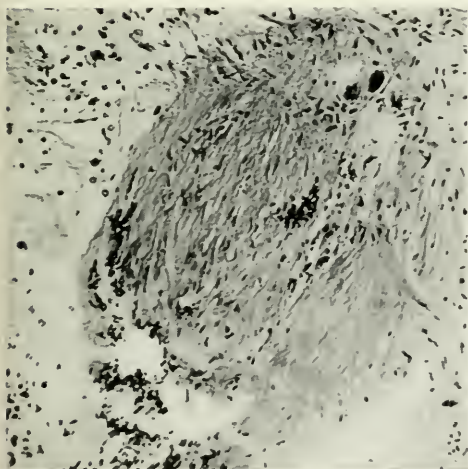


FIG. 18 ($\times 140$ diam.).

An area of non-striated muscle.

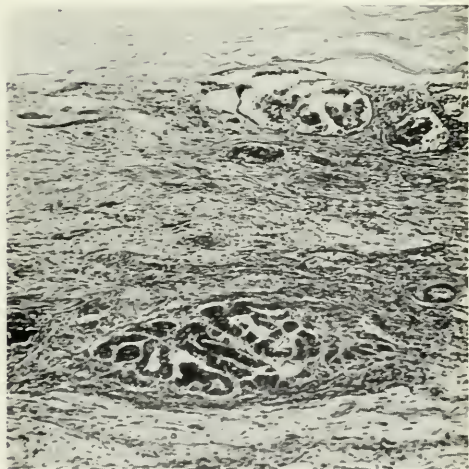


FIG. 19 ($\times 90$ diam.).

Metastatic growths in the overlying omentum. They are originally adenomatous in structure, but they are undergoing a sarcomatous degeneration.

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The immediate mortality of the operation, according to Döderlein and Birch-Herschfeld,⁹ is 40 per cent. Walker¹⁰ gives a mortality of 36 per cent. in 74 operative cases. Albarran and Imbert¹¹ find that the mortality is progressively less the later the statistics. The following table shows this clearly:—

	Cases.	Deaths.	Per cent.
From 1876 to 1890 . . .	34	18	52
„ 1890 „ 1895 . . .	32	7	21
„ 1895 „ 1902 . . .	90	23	25

It is interesting that in the younger groups of children the mortality is lower than in those of greater age. Albarran and Imbert¹² in a list of 41 cases, in which the age was two years and under, found five operative deaths, a proportion of 12.2 per cent.

My own experience has been a very limited one. Only seven cases have been dealt with. Three of these were unsuitable for operation on account of extension of the growth. In the four cases which were treated by complete removal of the tumour, there was no post-operative fatality.

The disease is apt to recur even after a most thorough operation, and of the four cases in the series which made a post-operative recovery, only one still survives, and two years have now elapsed since this case was submitted to operation.

My thanks are due to Professor James Ritchie for his careful criticism of that portion of the paper which deals with the pathological aspects; and to the Carnegie Trust for a grant towards the cost of reproducing the illustrations.

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THE DIAGNOSIS AND TREATMENT OF CALCULUS IN THE PELVIC PORTION OF THE URETER.*

By HENRY WADE, M.D., F.R.C.S., Assistant-Surgeon,
Royal Infirmary ; Surgeon to Leith Hospital.

AS the majority of the cases on which this communication is based were examined by me when on service with the Army in the East, I purpose mentioning first of all the circumstances under which so large a number came under my care.

There are few indications of injury or disease that produce more alarm in the mind of the layman of our race than the appearance of blood in the urine he voids. At the same time the medical man in attendance on such cases realises that an accurate knowledge of the cause of the bleeding is usually impossible without the assistance of the centrifuge, the microscope, and the radiogram.

When, therefore, as occurred so frequently with us in Palestine, the Regimental Medical Officer had such a case, it was his custom to send his patient at once down the line for admission to hospital for diagnosis and treatment. The long single line of communication through the desert, and the numerous halting-places by the way, not infrequently meant that a full fortnight might elapse before he was admitted to one of the larger hospitals in Egypt, where a complete examination of his case could be carried out. In certain cases by that time the patient was found to be apparently cured ; but in view of the fact that the round trip back to his unit occupied frequently as long as five weeks, it was considered advisable in these cases to exclude finally the presence of a calculus or other more serious cause of the bleeding. To shorten this period, in the later stages of the war, centres where a complete examination could be carried out were formed closer to the troops in the field.

The incidence of hæmaturia was probably more commonly met with in the troops in the East than on any other front, and in the Egyptian Expeditionary Force great importance was attached to its occurrence, owing to the possibility of it being due to bilharziasis.

About 90 per cent. of the adult fellaheen population of

* Communicated to the Medico-Chirurgical Society of Edinburgh,
3rd March 1920.

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Egypt suffer from this disease. They spend a great part of their life paddling in the water that irrigates their fields, and when there the minute cercariæ, liberated from the body of the infected snail, penetrate their skin, inducing the disease or leading to another reinfection.

Fortunately, few of our men were infected. A number of Australians, when encamped at Tel-el-Kebir, contracted the disease. A serious outbreak occurred among the troopers of the West Riding Yeomanry, who were infected when stationed in the Fayoum, and some men contracted vesical bilharziasis when quartered near Suez. Although the cases were few, all the troops stationed in Egypt, or those passing through that country, were exposed to the liability of infection. We had therefore to be constantly on the outlook for the occurrence of the disease. Any case, therefore, of hæmaturia was examined most carefully, especially as it was not always possible to detect the ova in the urine.

The life led by the troops in the Desert of Sinai was such as to predispose unduly to the production of calculi. They existed on a limited water ration of half a gallon per man per day. This ration was for all purposes—drinking, cooking food, and washing. A bath in fresh water was therefore often unknown for weeks on end. The troops lived in the sandy desert where in summer the mid-day temperature frequently rose to 110° F. in the shade. They naturally perspired abundantly. Finally, their diet consisted of the usual army rations of bully beef, biscuit or bread, bacon, and tea. Oxaluria and calculus formation were under these circumstances not uncommon.

Many cases of this nature came under my care, and the material was so abundant we were able to establish a routine method of examination.

The cases were in the great majority ones of early disease and arrived with the provisional diagnosis of hæmaturia, oxaluria, renal colic, or renal calculus. Here I may mention that the incidence of oxaluria was greatly diminished as our accuracy in the diagnosis of renal and ureteral calculi increased.

The characteristic clinical indications of a stone in the ureter can be best illustrated by a typical case:—

CASE.—This officer was examined by me in consultation with Lieut.-Colonel Newton, Officer Commanding New Zealand Mounted Brigade Field Ambulance. Colonel Newton had been consulted by him on several occasions during the previous year for what was taken to be

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either attacks of oxaluria or calculus in the ureter. As these attacks had become more severe and more frequent, he came to Cairo for further examination, and treatment if necessary.

Colonel Newton provided the following notes with reference to his patient's health:—"During the last year the patient has had about six definite attacks which have had much in common, but have presented certain points of difference. The leading features of a typical attack are as follows:—Vague malaise for a few hours followed by an acute attack of vomiting, abdominal pain, and backache. In from four to six hours after treatment the acute symptoms subsided, and a convalescence follows of two to seven days' duration. In the intervals between the attacks the patient is in good general health and attends to his important duties in the field."

The leading features of the syndrome are:—*Vomiting*—This is usually severe and bears no relationship to the taking of food which does not relieve the pain. The vomiting is frequently repeated. In one or two attacks it has only been a slight feature of his illness. *Pain*—This has been the most constant symptom. It is very severe and causes the patient to look drawn and anxious. The site of the pain varies. It frequently is most severe over the left lumbar muscles of the back. It is frequently abdominal, and this slightly in the epigastrium, but particularly in the lumbar region, but *never* the right half of the abdomen. In one attack the pain was so localised to the back that it suggested a very acute lumbago, but there was on this occasion very severe vomiting. The pain at certain periods descends towards the left groin, but not to the penis or testicles. The pain is relieved by the application of hot fomentations, but only after two or three hours of vigorous treatment. Shock is always a prominent feature of this case. The abdomen is always soft and flaccid. *Tenderness*—This is always present, being situated either in the lumbar region of the back or abdominally in the neighbourhood of the left kidney. The tenderness persists for from twenty-four to seventy-two hours. There is never any palpable abdominal swelling. *Diarrhœa*—This is never a prominent feature and possibly has resulted from the taking of purgative pills on the occasion on which it has occurred. There has never been melœna.

Urine—This has been examined on two or three occasions, and the following is the report of the analysis made by the Anzac Pathological Laboratory of a twenty-four hours' sample:—Quantity, 42 oz.; reaction, acid; sp. g., 1018; no blood or sugar; very faint cloud of albumen. The microscopic examination of a centrifuged specimen shows one or two epithelial cells; no blood cells; urates, and a few oxalate crystals.

The blood-pressure is raised during an attack. The patient is

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liable to colds and has twice had tracheitis. There are no signs of tuberculous disease of the lungs. *Nervous System*—His knee jerks at present. The pupils react to light. His eyesight is satisfactory.

Frequency of Micturition—This has been a marked feature of one or two attacks, and was particularly evident during the last one. Patient's temperature is never raised.

The following is a report on the patient's health during an attack on May 22-23:—

The patient suffered from malaise for two days before the 22nd. On the morning of the 22nd he was seized with acute diarrhoea. At 13.00 the patient complained of considerable abdominal pain and nausea. Vomiting commenced at 13.30. Frequency of micturition and pain on micturition was complained of at this time. On examination the abdomen was flaccid. No tenderness could be elicited. The skin was cold and sweating. The patient was obviously suffering from shock. His temperature was subnormal. Later in the day the patient complained of pain in the back.

When originally examined by me in consultation with Colonel Newton, the patient's history was taken to indicate the presence of a calculus in the left ureter. His general health was good, and the only physical sign detected was a palpable kidney which was prolapsed, but neither tender nor apparently unduly enlarged.

With a view to further examination, he was transferred to Nasrieh Schools Hospital, Cairo, under the care of Captain Duggan. The urine on examination was found to contain a few oxalate of lime crystals, but no red blood cells. After the customary preparation of the patient, an X-ray examination was carried out. The X-ray photograph of the left kidney showed no evidence of the presence of a stone. A photograph was taken of the bony pelvis, using the intensifying screen which rendered the plate so granular as to make the findings uncertain, and in consequence another photograph was taken on account of two suspicious shadows seen in it. This latter photograph showed two distinct round shadows over the spine of the ischium on the left side, and above and to the inner side of these a faint irregular shadow. This irregular shadow was suspected to be due to a calculus in the pelvic portion of the left ureter, and consequently further examination was carried out.

On cystoscopic examination the bladder wall appeared healthy. Both ureteral openings were normal. An X-ray

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ureteral catheter passed readily up the right ureter into the renal pelvis. On the left side the ureteral catheter entered the ureteral opening readily, but was arrested 2.5 cms. from the orifice. The catheters were therefore left in position, and another X-ray photograph was taken. This showed the faintly outlined shadow with irregular contour to be a calculus in the left ureter, the tip of the catheter lying in proximity to it where it had been arrested in its progress. The small circular shadows were demonstrated to lie some distance from the ureter and they were taken to be due to small circular phleboliths.

The renal secretions from both kidneys were collected for twenty minutes after the X-ray examination. The amount secreted on the right side was about one-third greater than from the left kidney. The examination, which was conducted under local anæsthesia, was followed by no discomfort or complications, and the state of affairs that existed was explained to the patient.

Further operative treatment for the removal of the calculus was contra-indicated; no further hospital treatment was considered advisable.

The patient elected to return to his duties in the field, where he was under the care of Colonel Newton. He was advised as regards his diet and he took with him two dozen bottles of Contrexeville water, obtained by local purchase in Cairo.

Four weeks after leaving hospital he had another mild attack that lasted for one day. During the advance on Jerusalem he had another attack, but although indisposed carried on with his duties. During the summer of 1918, when serving in the Jordan Valley and on the other side of the Jordan, he had good health, but, prior to the final advance in September 1918, he had a third and most serious attack, accompanied by visible blood in the urine.

During this period I saw him on several occasions, and he was in good health. After the Armistice, a final X-ray examination was carried out, and the calculus was found to have passed into the bladder and to have been voided naturally.

The prominent features of a typical attack of renal colic due to a calculus in the ureter, as illustrated in this case, and borne out in many others, seem to be as follows:—

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The profound general prostration that accompanies it, the patient looking obviously seriously ill.

The pain of a typical attack does not seem to radiate so frequently as is generally believed. Many complain only of severe lumbar pain. This is, however, usually confined entirely to one side of the body.

The associated frequency of a desire to micturate is in my opinion an indication of great significance.

When examined in the interval between attacks, the patient usually appears in perfect health. The only physical sign I found frequently enough to warrant being recorded was prolapse of the kidney on the side affected. Frequently it is palpable but not tender. This displacement is not difficult to account for, when the great engorgement of it that temporary obstruction of the ureter produces is realised. This increase in the size of the organ produces displacement and atrophy of the perinephric fat and consequent prolapse.

Absence of blood in the urine on microscopical examination at this period is of course no contra-indication of the presence of a stone in the ureter.

The value of an X-ray examination is realised by all. In my opinion a good radiogram should always show the shadow of a stone. The commonest source of error are phleboliths. There are of course other possible fallacies. In two cases, what appeared to have been ossific deposits in the quadratus lumborum muscle were taken at first sight to be calculi in the abdominal ureter.

Cystoscopic examination of the ureteral orifices most frequently gives no positive evidence, even when the stone is situated as closely as 1.5 cms. from the opening. The stone may in certain cases, however, be seen projecting from the opening, or the orifice may show the damage, the result of its passage. When first seen this damage may appear very great, the lips of the opening being torn and ragged, swollen and oedematous, with a bullous cystitis in the neighbourhood. This is, however, rapidly recovered from.

The passage of an X-ray catheter is by far and away the most accurate and certain means of diagnosing the presence of a stone, locating its position, and estimating the harm that its presence is producing. Incidentally, it is also an excellent form of treatment.

The routine method of examination we employed was to

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examine a centrifuged deposit of urine in all cases of hæmaturia. The patient having been prepared, a complete X-ray examination of both kidneys, ureters, and bladder was then done. If a suspicion of calculus existed, a cystoscopic examination was then carried out under a local anæsthetic and an X-ray catheter passed up both ureters. If obstruction was met with, the catheters were left in position and an X-ray photograph taken, after which the urine from both kidneys was collected for twenty minutes and examined.

In a few selected cases pyelography was practised by filling the renal pelvis and ureter with 15 per cent. collargol, and then taking a photograph. By this means not only the nature and site of obstruction could be determined, but its degree could also be estimated and the amount of damage to the kidney it was producing revealed.

If the presence of a stone was diagnosed and the damage not great, as was virtually always the case, time was allowed to elapse to see whether a natural expulsion would result. A subsequent X-ray photograph was taken and compared with the former to determine whether the stone had been moved from its former site.

In certain cases chromocystoscopy was employed to determine the amount of obstruction at this stage.

Out of over fifty cases that were examined, I have the records of only six that were operated on, and two of these were extracted out of the ureter by intravesical forceps. Of the remaining four, two were impacted in the ureteral orifice and removed by suprapubic cystotomy, and only two were removed by suprapubic opening of the ureter.

The justification for operation is based on our knowledge of the surgical pathology of the disease. The stone is usually voided naturally. It may become impacted and cause obstruction; consequently renal infection is a possibility, but the most usual and most insidious damage is hydronephrosis and renal atrophy, or a movable kidney. It may remain *in situ* and increase to great size. It may be voided into the bladder and remain there, forming the nucleus of a vesical calculus.

The problem, therefore, is when to trust to a natural expulsion occurring at a reasonably early date without serious impairment of the functional activity of the kidney above, and this can be best determined by the method already described, which is at the same time the most useful form of treatment to hasten the passing of the stone.

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This examination having been carried out, the patient is encouraged to lead an active life, to drink fluids in excess, Contrexeville or Salutaris water, if he so desire, and be prepared for a subsequent attack, the nature and possible benefits of which he has had explained to him.

The suprapubic removal of a calculus from the pelvic ureter is a major operation attended with a mortality of 2 per cent. The number of cases requiring this will in the near future be further reduced by intravesical operative treatment. The lines on which this is at present being conducted are as follows:—

1. Injection of glycerine into the ureter. I have done it on several occasions. It is easy of practice, but difficult to prove the utility of.
2. Slitting the ureteral orifice with the intravesical knife. This sounds difficult, but is really easy to do, and is of benefit in the case of impacted stone at the opening.
3. Dilatation of the ureter by graduated bougie.
4. Dilatation of the ureter by the active electrode of a high frequency or diathermy current. This last method was introduced by Buerger of New York and appears to warrant further trial.

The recognition of a case of renal or ureteral calculus when the patient is enduring a severe attack of renal colic is not difficult. When, however, the attack having passed off, he is observed for the first time by the surgeon, the diagnosis of his ailment and the decision as regards the best course of treatment to follow is a much more difficult matter, as he is frequently then apparently in perfect health. In the latter case, when the history of the attacks of renal colic he had endured is being investigated, the most important clinical indications of a calculus impacted in the ureter are as follows:—

More important than the classical radiation of the pain is the fact that it is so constantly confined entirely to one side of the body. The presence of blood in the urine is usually then observed and described as having occurred. In almost every case information with regard to the presence of an increased frequency in the desire to micturate will be volunteered as having been associated with the attacks he suffered from.

When examined some time after the acute attack has subsided, the only physical sign observed frequently by me in these cases at the clinical examination has been the palpable kidney on the affected side. The organ is felt to be prolapsed,

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but is neither tender nor enlarged. The presence of a few red blood cells in the urine, detected when the urine is centrifuged and the deposit examined, is strong presumptive evidence that a calculus is present. The absence of these cells, however, in no way contra-indicates its presence, as frequently cases are met with where a calculus of appreciable size is impacted in the ureter and no ulceration has resulted.

The history and the facts previously mentioned having warranted further examination, an X-ray photograph of the entire urinary tract is taken. The presence of phleboliths in the pelvis leads to confusion, as they are liable to be mistaken for calculi. In differentiating between the two, it is of importance to remember that the majority of phleboliths are observed situated to the outer side of the normal position of the ureter, the commonest situation in which they occur being in the neighbourhood of the ischial spines. They may, however, be situated directly in the normal line of the ureter; but even then their nature can usually be suspected if not recognised by the fact that they are of circular or oval contour with a smooth and sharply defined margin.

The exact differential diagnosis is, however, not possible without a further cystoscopic examination. For this purpose a local anæsthetic is much to be preferred. It is also essential that facilities exist for the examination being conducted in immediate proximity to the X-ray apparatus. The cystoscopic examination may show the stone protruding from the ureter which may be damaged from its presence close to the orifice. In the great majority of cases, however, even when the stone is as close as 2 cms. to the opening, no alteration is seen in the ureter on that side.

When a catheter is passed, it will be arrested when it comes in contact with the stone in virtually all cases, and a subsequent photograph reveals the cause of the obstruction. It is to be advised that after the photograph has been taken, the catheters be left in position for twenty minutes or half an hour, and the secretion from the two kidneys be collected. Usually the secretion on the side obstructed is slightly less than on the other side. When, however, the flow from both sides is abundant and the disproportion not undue, the obstruction may be considered as in no way seriously impairing the functional power of the kidney above.

In such cases the course of treatment advised is to wait

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and see whether a natural expulsion of the stone will take place. The passage of the catheter often expedites this. After a few weeks it is advisable to take another X-ray photograph on the exact same plane as the previous one and observe whether the stone has passed further down the ureter.

When the delay is prolonged or the attacks of colic of repeated incidence, intravesical dilatation of the ureter is to be strongly recommended, employing any of the various methods already described. If these fail, or if the obstruction be more severe, and especially if infection of the renal pelvis above be revealed, operative treatment where the ureter is opened from above is then to be recommended. In such cases the extra-peritoneal route is usually employed. In several cases however, I have employed the trans-peritoneal route without regretting it.

NOTES ON AN OPERATION FOR LARGE MIDLINE VENTRAL HERNIA.*

By GEORGE CHIENE, M.B., C.M., F.R.C.S., Senior
Assistant Surgeon, Edinburgh Royal Infirmary.

I PROPOSE to submit for your approval or criticism an operation for large midline ventral hernia. I first performed the operation in January 1911, and have since shown cases at clinical meetings of this society. Drawings of the steps of the operation were demonstrated at the British Medical Association Meeting in Aberdeen just before the outbreak of war.

It may be advisable first to draw attention to the treatment at present in vogue for the condition. The problem before the surgeon is that the recti muscles of the abdominal wall are widely separated, the peritoneum protrudes between the muscles, the only coverings of the abdominal contents are a thin layer of peritoneum covered by stretched skin with little or no subcutaneous tissue.

The treatment may be palliative or operative, but the latter is gradually taking the place of the former in all cases otherwise suitable for operation. The palliative treatment, consisting of some form of abdominal support, is not, as a rule, satisfactory. The operative treatment consists in an attempt to close the defect by drawing the recti muscles and their fibrous sheaths together by simple or overlapping sutures, or, in cases in which the gap in the abdominal wall is large, by planting a metal filigree. Personally I am strongly opposed to the latter method if the patient's own tissues can, in any way, be used for the same purpose; and I think they can.

We are not at present considering cases of umbilical hernia, for which William Mayo's overlapping operation, now so well known, is frequently employed, but herniæ which usually occur after operations performed through long midline incisions. It has been stated that the linea alba was designed so that surgeons might have an ideal route through which to explore the abdomen—nevertheless, herniæ do occur in this situation.

Discounting for the moment the use of the filigree, the operation most usually employed is to pare the fibrous edges of the opening and then to suture the various layers of the abdominal

* Contributed to the Medico-Chirurgical Society of Edinburgh, 3rd March 1920.

Operation for Midline Ventral Hernia

wall like to like, or, when possible, strengthening the line of suture by overlapping the various layers. The latter method is usually found to give better results if it can be carried out. It should be remembered, however, that, during the formation of the hernia, a tug of war has been going on between the two groups of oblique muscles of the abdominal wall. Frequently this lateral pull has caused so much separation that great difficulty is met with when an attempt is made to close the opening; the result is that there is marked tension on the sutures, whether they be simple or overlapping. This tension is so great that sooner or later a recurrence of the hernia not infrequently takes place.

The object of the present operation is to minimise the above difficulties: in the first place by diminishing the lateral pull of the oblique muscles of the abdomen, and in the second by strengthening the midline sutures by the addition of another layer of fascia. Its accomplishment is aided by the fact that the external oblique muscles do not fuse with the anterior fibres of the internal oblique at or near the outer border of the rectus as is usually supposed, but can be separated from the latter to near the middle of the muscle. Separation will be found difficult only at the tendinous intersections in the upper part of the muscle above the umbilicus, but this can be overcome by a little undercutting.

The hernial contents having been dealt with in the usual way and the fibrous edges of the hernial opening having been pared, so as to demonstrate the various abdominal layers, the skin and subcutaneous tissue are freely undermined as far as, or just beyond, the outer border of the rectus muscle on either side; two vertical incisions are then made at this point parallel with the outer border of the rectus muscle through the aponeurosis of the external oblique. Those incisions should extend at least an inch beyond the upper and lower limits of the hernial opening. Secondary horizontal incisions are then made at the upper and lower ends of the vertical incisions. By dissection towards the middle line two flaps of fascia are formed with their hinges about the middle of the anterior sheath of the rectus muscle.

The vertical incisions through the aponeurosis of the external oblique muscles at once diminish the tension or lateral pull of the oblique muscles. When the edges of the wound are drawn together two large ovoid gaps are formed in the external oblique, through which the internal oblique is exposed to view. After

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the various layers of the abdominal wall have been sutured the fascial flaps formed from the external oblique overlying the outer border of the rectus muscle are turned inwards, overlapped, and sutured in the middle line, which is thus considerably strengthened.

Any one who is accustomed to perform the operations usually employed for this condition and who cares to try the method just described will at once be struck by the comparative ease with which he is able to draw the lateral margins of the wound together.

The question will at once suggest itself, what about the gaps formed in the external oblique; do they not cause a weakness in the abdominal wall at the outer border of the rectus muscle? Undoubtedly they do, as there are only two layers of muscle at this point instead of three, but in the cases I have operated upon no harm has resulted.

The main purpose of the operation just described is to minimise the lateral pull on the wound by the oblique muscles, but, by utilising the fascial flaps in the way I have suggested, the midline sutures are considerably strengthened.

CRITICAL REVIEW

THE EUSTACHIAN TUBE: ITS SIGNIFICANCE IN OTOTOLOGY.

By DOUGLAS GUTHRIE, M.D., F.R.C.S.

THE important role of the Eustachian tube in the etiology, diagnosis, and treatment of diseases of the ear has long been recognised and appreciated.

It is the main channel through which infection is conveyed from the nasopharynx to the middle ear in cases of suppurative otitis media, and the appalling frequency of this disease in childhood is easily explained when one remembers that the cartilaginous portion of the Eustachian tube is really a part of the nasopharynx and shares in the affections of that cavity. Adenoiditis—Eustachian salpingitis—otitis is a very usual sequence of events. An obstructed Eustachian tube may cause not only deafness but tinnitus and vertigo, and it has lately been shown that disorders of equilibrium in aviators are more frequently the result of Eustachian obstruction than of any primary affection of the labyrinth. The time-honoured treatment of the so-called catarrhal otitis, by inflation of air through the Eustachian tube, has been supplemented by the injection of various medicated fluids, while lavage by way of the tube, in aural suppuration, is a method of treatment which gives good results in cases in which the tube is the source of infection and of reinfection. Since the introduction of the nasopharyngoscope, the investigation and treatment of the Eustachian tube from its pharyngeal extremity has been conducted with scientific precision, and the value of this instrument will doubtless become more apparent in future.

A knowledge of this important anatomical structure, therefore, cannot fail to be of interest and importance to all who practise otology.

Anatomy and Physiology.—Although its existence was known to Celsus and Vesalius, Bartolomeus Eustachius¹ (1510-1574) was the first to give a clear description of the tube which bears his name. He compared it to a quill pen, and recognised its division into osseous and cartilaginous parts. It was, however, Valsalva² who described the function of the Eustachian tube, and initiated the controversy which still continues on the question, "Is the tube normally open or closed?" The answer most generally approved to-day is, that the tube is in its normal condition lightly closed, but that it may readily become opened by muscular action.

As might be expected, the musculature of the Eustachian tube has

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attracted the attention of many anatomists since Tourtal³ first pointed out the intimate connection of the palate muscles with its walls. The subject was studied by Troltsch,⁴ who was of opinion that the levator palati closed the Eustachian tube, while the tensor palati opened it, and to those muscles he gave the names abductor and adductor tubæ. Fournie,⁵ on the other hand, regarded all the tube muscles as closers of the tube, their function being to favour the progress of air along the narrow lumen by a kind of peristaltic motion.

In his classical monograph on the Eustachian tube, Rudinger⁶ stated that the upper part, as seen on transverse section, or, as he called it, the "safety tube," remained constantly open, while the lower part or "accessory cleft" was opened only by muscular action. His remarks apply to the cartilaginous part of the tube, as the bony part is, of course, always open. By means of his well-known manometric experiments in 1861, Politzer⁷ demonstrated that the tube was normally a closed structure, and only opened during swallowing, etc., though in some individuals there was a slight passage of air during respiration, the respiratory movements being registered on the manometer. In an unfinished paper published just before his death, Joseph Toynbee⁸ showed that a closed Eustachian tube was necessary for perfect hearing, and that the normal tube became opened only during muscular action, for, if the lumen were constantly open, the sound waves, reaching each side of the tympanic membrane, would antagonise each other.

It is sometimes possible to see the pharyngeal end of the Eustachian tube by anterior rhinoscopy, in cases of atrophic rhinitis, but this region may now be much more readily studied by the nasopharyngoscope, which resembles a miniature cystoscope. The opening up of the pharyngeal ostium during deglutition, etc., is familiar to all who employ this instrument.

Extensive researches were carried out by Zuckerkandl⁹ on the comparative anatomy of the Eustachian tube in various mammals. In such primitive forms as the platypus, sloth, and dolphin the tube is simply an open canal, as it is in amphibians. The cartilage is a structure of higher development. Absent in marsupials, it is found in the bear, seal, and rat, in which animals, however, it is not bent over the Eustachian tube but exists as a simple supporting plate.

The development of the Eustachian tube has been investigated by Frazer,¹⁰ who stated that it was derived from a recess in the pharyngeal cavity, containing elements of the 1st, 2nd, and 3rd arches. Developmental defects are uncommon. According to Schwalbe,¹¹ the commonest defect is an abnormal width of the pharyngeal ostium, which may, in some instances, admit the finger. In a case described by Citelli,¹² there was a large diverticulum in the Eustachian tube of a

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child aged two months, resembling the air-sac which is found in certain animals, notably the horse and the bat.

The histology of the Eustachian tube has been studied by Gerlach,¹³ who found lymphoid tissue in its walls in a specimen from an infant of six months. To this tissue he gave the name "tube tonsil." A similar investigation was carried out by Anton¹⁴ in thirty-five cases. He could find no lymphoid tissue in the Eustachian tube of the foetus, though it appeared in the new-born infant, attained its greatest development at the age of two years, and then underwent retrogression. Thus, the tube-tonsil reaches its maximum size earlier than does the faucial tonsil. Lymphoid tissue is said to extend as far as the tympanic end of the tube.

Another noteworthy contribution to the microscopic anatomy was made by Ostmann,¹⁵ who laid stress on the existence of a fatty pad which lies between the tensor and levator palati muscles on the one hand, and the wall of the tube on the other. This pad maintains the closure of the tube and thus protects the middle ear against infection. In diseases accompanied by loss of flesh, this fatty pad atrophies, and the patient may become more conscious of the sound of his own voice, a condition known as autophonia.

Pathology.—The pathology of the Eustachian tube has received comparatively scant attention, partly, no doubt, owing to the difficulty of securing post-mortem specimens of a structure so inaccessible.

In his book, Toynbee¹⁶ stated that it was singularly free from morbid alterations. He examined the tube post-mortem in 1523 cases, and found organic *stricture* on only three occasions. In two instances the cartilaginous, and in one the bony tube was affected. In the latter case the stricture was a third of an inch long, and only admitted a bristle. Other investigators are agreed that organic strictures are very rare. Bryant¹⁷ found none at post-mortems, and regards all the so-called strictures as due to swelling of the mucous membrane.

Jacob¹⁸ described two cases of nasopharyngeal *sarcoma* in which the Eustachian tube formed the centre of the tumour. The symptoms were deafness, headache, and nasal obstruction. Evolution was rapid and prognosis grave.

Observations on the living pathology of the Eustachian tube have become more frequent since the improvement of our methods of examination. The pharyngeal end of the tube was examined during life by Holmes¹⁹ in 2000 cases, by means of his nasopharyngoscope. He found tumour (fibroma) in two cases, syphilitic ulcer in four cases, and lupus in one case. Walker Wood²⁰ has summarised his experience of nasopharyngoscopic examination of 650 cases in an important paper which should be studied by all who wish to employ this instrument.

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Salpingitis was present in 456 cases, while adenoid remains in Rosenmuller's fossa were also commonly found.

Other contributors to the literature of endorhinology are Yearsley²¹ and Watson Williams.²²

Foreign bodies not infrequently invade the Eustachian tube. For example, Truatmann²³ had a case of cherry stone which had remained for a year impacted in the pharyngeal ostium, causing suppurative otitis media, which was cured by removal of the foreign body. Piff²⁴ reports a stalk of grass in the Eustachian tube, causing acute otitis, abscess formation at the base of the skull, and arthritis of the occipito-atlantoid joint. Death resulted from the rupture of an aneurism of the vertebral artery. Not infrequently the end of a Eustachian bougie becomes broken off within the tube. Such cases are described by Andry and Reynolds,²⁵ Tansley,²⁶ Wendt,²⁷ and others. A foreign body may wander from the pharyngeal end of the tube and make its appearance in the ear. Urbanschitsch²⁸ saw this happen, the foreign body being a grain of rice, while Camerer²⁹ had a similar case (piece of straw). A case in which a sewing needle, introduced into the ear, appeared in the pharynx, is mentioned by Schwartz.³⁰ Holm³¹ described the removal of a roundworm (*ascaris*), 10 cm. long and 2 mm. thick, from the ear of a child aged three, who suffered from chronic suppurative otitis. Somewhat similar is the case lately recorded by Coussien.³² The patient was a child aged four, who suffered from pain in the ear, apparently due to otitis. Paracentesis gave no relief, but some hours later the meatus was blocked by a foreign body which, on removal, was found to be a living *ascaris*, 15 cm. long. Prompt recovery followed. In those cases the worm had doubtless migrated from the pharynx to the ear by way of the Eustachian tube.

Diagnosis and Treatment.—Although the possibility of catheterising the Eustachian tube had been considered by the early anatomists, the method was first demonstrated by a layman.

In 1724 M. Guyot,³³ postmaster at Versailles, relieved his own deafness by means of a bent tin tube, which he introduced through the mouth and behind the palate to the Eustachian orifice. Air was then blown in by a pump attachment. Guyot brought his invention before the notice of the Paris Academy, but it attracted little attention. Cleland,³⁴ who had not heard of Guyot, recommended in 1741 the introduction of a catheter through the nose. He used a slender silver tube which was covered, at its distal end, with the urethra of a sheep, and was connected with a syringe, so that water might be injected to wash out the Eustachian lumen. Other pioneers of catheterism were Petit³⁵ and Wathen,³⁶ but the procedure was slowly adopted on account of technical difficulties. The position of the pharyngeal end

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of the Eustachian tube is subject to much variation, so that measurements are of little value in passing the catheter. Catheterism through the mouth had the support of Pomeroy³⁷ and Kyle,³⁸ but soon fell into disfavour, as also did the use of a catheter with a long beak, introduced through the opposite nostril, on the suggestion of Deleau.³⁹

In 1863, Politzer⁴⁰ advocated the method of inflating the Eustachian tube which bears his name, stating that a greater effect could be obtained by this means than by the Valsalva method or the catheter. Toynbee⁴¹ further advanced the subject by the introduction of auscultation, with his otoscope, as a means of diagnosis. In recent times a great advance was accomplished on the introduction, by Yankauer,⁴² of his speculum for direct inspection of the nasopharynx, and by Holmes,⁴³ of his nasopharyngoscope, to which reference has already been made.

Holmes claimed good results from the treatment of the pharyngeal ostium of the Eustachian tube under the guidance of his instrument. Hypertrophied posterior ends, adenoid remains, adhesions in Rosenmuller's fossa, etc., are all readily recognised. Thirty-one cases of acute otitis media were treated by the application of argyrol to the tube, and all subsided without perforation.

In another paper, Holmes⁴⁴ summarises the treatment of eighteen cases of chronic catarrhal otitis by attention to the Eustachian tube. The hearing was improved in eight cases, three of which had been diagnosed as otosclerosis.

Harris⁴⁵ described his experience of the nasopharyngoscope in treatment, and decried the indiscriminate use of Politzer's bag. In chronic catarrh he had good results from bougies and applications of argyrol.

Walker Wood⁴⁶ has reported the results of direct treatment of the Eustachian tube, under the guidance of the nasopharyngoscope, in seventy-one cases. Treatment consisted in the removal of adenoid remains, and in repeated applications of argyrol, etc. The majority of cases of salpingitis were cured, while the injection of argyrol and silver nitrate solutions gave encouraging results in chronic middle-ear suppuration.

M'Kenzie⁴⁷ has reported favourably upon the injection, per catheter, of an oily solution of menthol, iodine, and camphor.

In a paper on Eustachian salpingitis, Urbanschitsch⁴⁸ drew attention to the existence of this condition in every case of chronic middle-ear suppuration. The tube is abnormally patent in such cases, so that methylene blue solution, dropped into the ear, may, by means of the nasopharyngoscope, be seen issuing from the pharyngeal ostium. The author advises treatment by lavage of the Eustachian tube, from

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tympanum to pharynx, or in the reverse direction by means of catheter irrigation.

Yankauer⁴⁹ has also given attention to the condition of the Eustachian tube in chronic middle-ear suppuration. He showed that the function of the intact tympanic membrane is to protect the middle ear against infection by way of the tube. It is not easy to blow septic material from the pharynx through the tube, unless the tympanic membrane is perforated. As a means of avoiding the constant reinfection, which is the cause of the chronicity in many cases of otitis, closure of the Eustachian tube is advised. This, Yankauer accomplished by curettage through the meatus, with a curved curette which is designed to evert the mucosa like the finger of a glove. Eleven cases were reported by M'Cullagh,⁵⁰ in which curettage of the Eustachian tube had been tried. In all, the labyrinth was intact, and the disease was of long standing and had resisted local treatment. Four cases were cured, six were improved, and one was unaltered.

Five years after its introduction, Yankauer⁵¹ made a collective investigation on curettage of the tube in aural suppuration. He collected 735 cases from the practices of 119 operators, the number of cases per operator varying from 1 to 53. The tube was closed in 609 cases (83 per cent.), while 379 (51 per cent.) were cured of suppuration. Hearing was improved in 46 per cent., was stationary in 50 per cent., and was worse in 4 per cent.

It is a noteworthy fact that, when the Eustachian tube has been successfully closed, the perforation in the tympanic membrane will never heal. On account of this drawback to his operation, Yankauer advised that, in cases where the perforation is likely to heal, the tube should not be curetted but should be left open. This advice ought certainly to be followed in case of children, whose short and wide Eustachian tubes are, in any case, difficult to close by curettage. Otologists are, however, in agreement regarding the desirability of securing closure of the Eustachian tube after a radical mastoid operation, though they differ in their views as to the best method of attaining this end. Gerber's⁵² attempt to close the tube by paraffin injections was unsuccessful, and the use of ivory pegs and other foreign bodies is not desirable. A thorough curettage of the tympanic end is the means most widely adopted, some surgeons even advising removal of the anterior bony wall of the meatus down to the capsule of the temporo-maxillary joint.

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NOTES ON BOOKS

The crusade against venereal disease has stimulated the production of numerous publications bearing upon different aspects of the problem. We note a few that have reached us.

The Venereal Problem, by E. T. Burke, D.S.O., M.B., Ch.B.(Glas.) (Henry Kimpton, price 7s. 6d. net), contains much sensible advice on the question, and should be read by all who are socially interested in the subject. There is much to be said for the author's advocacy of confidential notification, and for his condemnation of the present all too prevalent tendency of condemning offhand, as a moral perversity, every sufferer from venereal disease.

Venereal Diseases, by C. H. Browning, M.D., D.P.H., and David Watson, M.B., C.M. (Henry Frowde and Hodder & Stoughton, 1919, price 16s. net). In this practical handbook for students the authors wisely emphasise the importance of clinical pathology in both diagnosis and control of treatment. The pathological methods advocated are sound, and the description of the technique in the Wassermann test is good. The book is divided into two sections, the latter of which on gonorrhoea does not reach the same high level as the part on syphilis. There is no definite system laid down to guide the student how to proceed with the examination of a patient suffering from either acute or chronic gonorrhoea. The importance of lesions of the prostate, and the seminal vesicles in latent or chronic cases, is insufficiently emphasised either in diagnosis or treatment. Apart from the fact that the treatment is not always in line with present-day teaching, the authors are not explicit in their methods, and the student on reading the chapters on treatment must be left in a mental haze as to how to proceed with any given case. Chronic lesions in the female are scarcely dealt with at all. The standard of cure laid down in both male and female does not appear to us nearly stringent enough to eliminate the gonococcus carrier and to prevent the serious after-effects which arise from latent infectivity. The section on syphilis is concise, systematic, and is put before the student in a practical manner. More space might have been given to the differential diagnosis of secondary skin and throat lesions, and the treatment of antenatal and congenital syphilis could with advantage be dealt with more fully. Apart from these minor defects this section is well written. The illustrations, with one or two exceptions, are good, and the book contains a large amount of valuable information for the student.

The Practitioner's Manual of Venereal Diseases, by A. C. Magian (Wm. Heinemann (Medical Books), Ltd., 1919, price 10s. 6d. net) will appeal to the general practitioner in that it puts in a concise and lucid

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way the symptoms and treatment of venereal diseases. The systematic examination of every patient, the importance of personal attention to the details of treatment, and the separate study of each patient are rightly emphasised. We do not concur with all the author's views on treatment, and cannot support his haphazard methods in vaccine therapy where the practitioner is advised to give a vaccine "every third day or thereabouts," and is given no indication as to the reactions to look for to guide him before repeating or increasing the succeeding dose. Gonorrhœa in women is very insufficiently dealt with considering its importance.

In *Venereal Disease*, by Hugh Wansey Bayly, M.C. (J. & A. Churchill, price 10s. 6d. net), the author has attempted to condense the essentials of the prevention, symptoms, and treatment of venereal disease into the small compass of 150 pages. We cannot concur in the statement that "a fortnight's appropriate treatment will make a syphilitic practically non-infectious for the time," and few syphilologists of any experience will agree that even a case of early syphilis should be allowed to marry after the Wassermann is negative for one year only, or again, that the introduction of arsenobenzol treatment will permit of secondary cases marrying if they have shown no pathological or clinical evidence of infection for six months after the termination of the routine course of combined treatment. We cannot agree with the author that the danger of transmission of infection is minimal in such cases. In the chapters on gonorrhœa the necessity of practising asepsis in the taking of pathological specimens or in the local treatment of the urethra is not even mentioned. The treatment of gonorrhœa and its complications is not laid down on definite enough lines for either the practitioner or the student to follow. There are many inaccuracies in the text, which gives us the impression that it has been hurriedly written. The illustrations are needlessly diagrammatic and, with few exceptions, poor. The man who has sufficient knowledge of the subject may, with discrimination, get valuable information from this book, but for the student and practitioner who are just beginning it would be wise to choose a more accurate guide.

The Urethroscope in the Diagnosis and Treatment of Urethritis, by Major N. P. L. Lumb, R.A.M.C. (John Bale, Sons & Danielsson, Ltd., 1919, price 10s. 6d. net). It is impossible to over-emphasise the importance of urethroscopy in the diagnosis and control of the treatment of gonorrhœa, and Major Lumb's work is a welcome contribution to the subject. He handles the subject from practical first-hand knowledge; the technique is carefully described, and useful hints are given to the beginner to aid him in acquiring proficiency in the use of the instrument. The author describes carefully the normal urethra, and wisely lays more emphasis on the lesions commonly encountered

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than on the more rare pathological conditions. The illustrations are good, especially those in which the progress of the lesion is followed throughout a course of appropriate treatment. We can cordially recommend the book as a valuable contribution to scientific work, and it should prove useful alike to the student, practitioner, and the specialist.

In *An Outline of Genito-Urinary Surgery*, Dr G. G. Smith (W. B. Saunders Co., Ltd., price 12s. 6d.) has set out to place before medical students and practitioners, the important symptoms, the pathological findings, and methods of treatment in genito-urinary diseases. In attempting to do this in 300 pages, the information given is in parts inclined to be fragmentary, and in certain instances out of proportion to the relative importance of the various conditions. The chapters on gonorrhœa are clear and thorough expositions of the subject, and include the latest discoveries. Minor conditions are admirably dealt with, and the details of treatment are given fully and clearly.

Die Behandlung der Haut- und Geschlechtskrankheiten, by Dr Erich Hoffman (A. Marcus & E. Webers Verlag). In the second edition of this small volume the author gives us a useful summary of dermatology and of the methods used in treating various skin lesions. The alphabetical arrangement of disease is not an ideal one, but may be useful to practitioners who wish quickly to refresh their knowledge of any lesion and of the various methods of treating it. The sections on gonorrhœa and syphilis are concise, and contain much useful information for both student and practitioner.

In his *Principles of Anatomy as seen in the Hand* (J. & A. Churchill, price 15s. net.), Professor Wood Jones does not define what the principles of anatomy are, therefore the reader may find some difficulty in discovering, from the text, which of them are exemplified in the hand; nevertheless this book, like most of his writings, is very readable, and the senior student of anatomy will find it both interesting and instructive. For the most part it consists of a series of often retold stories, which are here revived under the light of the latest observations and are made piquant by sarcastic notices of the errors of unnamed predecessors and contemporaries. The piquancy of the sarcasms will be all the more enjoyed by the observant reader who notes the inaccurate and misleading descriptions and the inaccurate figures which are scattered here and there through the text. Had Professor Wood Jones used the principles of the B.N.A. terminology, which he abhors, his text and figures would have stood in less need of revision.

We have received from Messrs W. & A. K. Johnstone a set of the *Frohse Anatomical Charts*, drawn life-size, by Max Brodel. The plates are anatomically accurate and will be found invaluable by lecturers to nurses, ambulance classes, or in schools.

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Dr H. Clayton Fox's translation of Dr Georges Lauren's *Oto-Rhino-Laryngology* (J. Wright & Sons, price 17s. 6d.) is essentially practical, and under the headings "What to do" and "What to avoid," the busy doctor will find concise instructions regarding the treatment of all the common ear and throat diseases he may encounter in daily practice. It is unfortunate that "morcellement" with punch forceps is recommended as the treatment of enlarged tonsils, and that no mention is made of modern methods of enucleation. On the other hand, it is gratifying to find no reference to syringing in the treatment of middle-ear suppuration. The translation has been carried out so that the author's clear style is well preserved. The work is well illustrated.

The fourth edition of Dr Herbert Tilley's *Diseases of the Nose and Throat* (H. K. Lewis & Co., Ltd.) can be recommended to the senior student and the general practitioner desirous of keeping abreast of this specialty.

Everyone who is interested in the health of children should read this vigorous little book—*Child Welfare* (Baillière, Tindall & Cox, price 5s. net). It seems likely that a national public dental service will be created in the near future, ostensibly for the purpose of advancing the welfare of the child, and probably many thousands of pounds and much valuable time will be spent in the futile attempt to deal with the decayed teeth of the nation. It is as well, therefore, that Dr J. Sims Wallace should have published a number of selected essays so that those really interested in child welfare may know that by simple dietetic measures the disease can be easily prevented without any difficulty or expense to the individual or to the State, and with advantage to the general health of the child.

In his *Manual of Diseases of Children* (Edinburgh, E. & S. Livingstone, 1919), of which the second edition has just been published, Dr James Burnet has furnished the student with a guide which will probably be quite sufficient for examination purposes. Without in any way wishing to detract from the merits of the manual, one may disagree with the statement in the preface that "the student and general practitioner are not too well supplied with books on children's diseases."

Students and physicians will find Dr Joseph M'Farland's *Text-Book of Pathogenic Bacteria and Protozoa* (W. B. Saunders Co., Ltd., price 21s. net) readable and unobscured by matter too controversial for clinical application. The Widal test is still given priority in the diagnosis of typhoid, and we could wish for emphasis on its limitations. The treatment of complement-fixation in gonorrhœa scarcely indicates the value of the test, and the Weil-Felix reaction in typhus is sufficiently useful to have merited mention. Malaria is well described and

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beautifully illustrated, and the clear description of the Wassermann test will be appreciated by present readers. This, the ninth, deserves the popularity of former editions.

Dr Charles R. Box's *Post-Mortem Manual*, second edition (J. & A. Churchill, price 8s. 6d. net), is an excellent manual, which should be read by all who may have to perform autopsies. The technique is described in detail, the method of examination of the heart being specially clear and concise. The chapter on the investigation of cases of sudden death should be valuable to medical practitioners.

During the past few years the scientific branches of Medicine have made enormous advances, some of which have profoundly modified our conception of the physiological principles that underlie treatment. The busy practitioner has little time for consulting original papers, and to him we can thoroughly recommend *Physiological Principles in Treatment*, by W. Langdon Brown, fourth edition (Baillière, Tindall & Cox, price 7s. 6d. net), which contains much interesting information and many useful suggestions for rational treatment. Chapters are devoted to the modern ideas of acidosis, vitamins, organotherapy, glycosuria, and diabetes, and the current views of the treatment of cardiac and digestive disturbances are carefully explained.

Psychiatric-Neurologic Examination Methods, by Dr August Wimmer, authorised translation by Andrew W. Hoisholt, M.D. (Henry Kimpton, price 10s. 6d.), is a very complete account of the methods of examination of the nervous system, both from the physical and psychical aspects.

Among the American works on matters dealing with Public Health that have recently reached us we may mention:—*A Manual of Hygiene and Sanitation*, by Seneca Egbert, A.M., M.D. (Lea & Febiger, price \$3), which, in its seventh edition, is an agreeably written introduction to Public Health, profusely illustrated. *Hygiene and Public Health*, by George M. Price, M.D. (Lea & Febiger, price \$1.5), covers much the same ground. For the benefit of students a series of questions is appended to each chapter. *Milk*, by Paul G. Heinemann, Ph.D. (W. B. Saunders Co., Ltd., price \$25), is an exhaustive treatise in which the chemistry and bacteriology of milk are fully dealt with. The section on certified milk might be profitably studied by our Ministers of Health, who are searching for practical methods of safeguarding the health of the young; also the sections dealing with the commercial side of the milk question. *Rule for Recovery from Tuberculosis*, by Lawrason Brown (Lea & Febiger, 1919, \$1.50), was primarily written for the author's own patients in order that they might use it as a book of reference. There are short chapters on practically all the aspects of the tuberculous patient's daily life. The book is written for the intelligent consumptive,

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and the fact that it is now in its third edition is proof that it meets a distinct want, and can be heartily recommended.

Diet in Health and Disease, by Julius Friedenwald, M.D., and John Ruhrah, M.D. (W. B. Saunders Co., Ltd., London, cloth, 25s. net), has now run into its fifth edition. A very valuable portion of it is devoted to normal metabolism, food values, and diet at various ages and in various conditions. The major part, however, is devoted to diseases of abnormal metabolism and to those diseases in which diet is a primary factor either in cause or treatment. A table is inserted giving an analysis of the various diabetic foods. The modern treatment of diabetes is set forth in a clear and practical fashion, giving many tables of diets and exact rules for their use. The diet for nephritis, however, does not receive the same detailed attention. This volume contains much valuable information and should be of great value to all who wish to place dietetic treatment on a rational basis. *Diet Lists of the Presbyterian Hospital, New York City*, by Herbert S. Carter, A.M., M.D. (W. B. Saunders Co., Ltd., London, 6s. net), has been considerably enlarged in this (the second) edition. The material is set forth in a very simple and practical manner, and will be found of particular value to those who are to carry out a strict dietary in cases where dietetics play a prominent rôle in therapeutics.

Vital Statistics, by G. C. Whipple (Chapman & Hall, price 18s. 6d.), includes a brief historical account of the science of demography, a description of methods employed by the statistician in recording his facts, and a warning against the fallacies that are so apt to arise in connection with this science.

Aids to the Mathematics of Hygiene, by R. Bruce Ferguson, M.A., M.D., D.P.H. (Eng.) (Baillière, Tindall & Cox, price 3s. 6d. net), has reached its fifth edition.

The third edition of *A Handbook of Medical Jurisprudence and Toxicology*, by William A. Breud (Charles Griffin & Co., Ltd., 1919, price 10s. 6d. net), contains in quite short compass all that a student need know in order to face his examiners, and is, moreover, a little book which he may well keep by him for future reference, for it gives in a concise way a great deal of sound information as to the legal duties and obligations of the doctor in his relation to the community and the state.

A sixth edition of Wheeler's *Handbook of Medicine* (E. & S. Livingstone, 1920, 12s. net), under the very able editorship of Dr William R. Jack, requires but a word of commendation as a thoroughly practical and satisfactory student's manual. It deserves a wide circulation.

Dr R. S. Aitchison's well-known *Medical Handbook* (Charles

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Griffin & Co., Ltd., 1919, 10s. 6d. net) has deservedly reached its fifth edition. It is a compact student's guide to medicine, and has been thoroughly revised and brought up to date by the author.

An Index of Symptoms with Diagnostic Methods, by R. W. Leftwich, M.D., seventh edition revised by H. N. W. Collins (John Murray, 1920, price 15s. net). The standard text-books and "Systems" of Medicine have their subject-matter arranged under the headings of Diseases and are consequently of little use when a diagnosis is being sought for. In the present volume a more rational arrangement is adopted. The headings are symptoms or physical signs, and under each is grouped the various diseases in which it may be found.

Dr Leftwich's book should prove of considerable assistance to the medical man who is faced with a difficult case.

If it is necessary for the surgical nurse to be familiar with the technical and anatomical details of major operations, she will find all she wants in Mr Hey Groves' *Surgical Operations* (Henry Frowde and Hodder & Stoughton, price 21s. net). Excellent as the text and illustrations are, we cannot avoid the feeling that the perspective is wrong in "A text-book for Nurses."

Dr Timberg's *Home Exercises for Spinal Curvatures* (Wm. Heinemann, price 6s. net) is excellent so far as it goes, but in a second edition we should have looked for instructions regarding the "crawling" method. It can safely be placed in the hands of the laity as a guide to the proper performance of exercises selected by the doctor for any particular case.

In *Alcohol and the Human Body* (Macmillan & Co., 1920, 3s. net) the temperance reformer will find ample material to assist in his propaganda. In preparing the sixth edition Dr Mary Sturge has had the assistance of Dr Saleeby, and emendations by Sir Victor Horsley sent home from Egypt in 1916 are incorporated.

The Woman of Forty is the latest addition to the series of books on sex hygiene written by Dr Ethel Lowry (Forbes & Company, Chicago). It is commonplace and of no particular merit.

In *Modern Spiritism* (J. & A. Churchill, 1920, 3s. 6d. net) Dr Schofield offers a fair and unbiassed criticism of the phenomena of spiritualism from the standpoint of Christianity. His reputation as a psychologist entitles him to be heard with respect on this debatable topic.

Dr Kirkpatrick, Registrar of the Royal College of Physicians of Ireland, has compiled a biographical notice of *Henry Quinn, M.D.* (1718-91), who, it appears, while he enjoyed the most fashionable medical practice in Dublin during the earlier half of the eighteenth century, did not leave "anything as a permanent contribution to the study or progress of medicine." He did, however, leave "ready-

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money property" to the value of upwards of £30,000, and seems to have had other amiable qualities.

The advisability of the cobbler sticking to his last is exemplified in Dr Walton's *Oscar Montague Paranoid* (J. B. Lippincott Company), which is an excessively dull and invertebrate story.

We need do no more than note the appearance of the thirtieth volume of the *Transactions of the American Pediatric Society*, which is as usual full of valuable papers. The same remark may be applied to vol. xviii. of the *Johns Hopkins Hospital Reports*, which has also come to hand.

The Great War and the R.A.M.C., by Brevet Lieut.-Colonel F. S. Brereton, R.A.M.C. (Constable & Co., Ltd., price 12s. 6d. net.), is the first volume of the Popular Medical History of the War, with a preface by Lieut.-General Goodwin, Director-General, Army Medical Services. It is concerned with the doings of the medical units on the Western Front during the first two months of the war, and in its preparation official documents have been used. But it is more than a mere record of events. The trials and disasters and the supreme heroism of the Medical Service during the dark days of the retreat are described in a style that never fails to interest. Local colour is added by judicious quotation from diaries written at the time, and useful maps make the dispositions of even such small medical stations as regimental aid posts and advanced dressing stations clear. The book is very readable.

Field Ambulance Organisation and Administration, by Lieut.-Colonel James Hardie Neil, N.Z.M.C. (H. K. Lewis & Co., Ltd., price 4s. 6d. net), is a useful book written by an officer who commanded a field ambulance in the field. It contains chapters on the training of personnel, the function and interior economy of an ambulance, the quartermaster's department, the advanced dressing station, and the field ambulance during active operations. It gives a readable and adequate account of the functions and the equipment of an ambulance.

BOOKS RECEIVED

- AMERICAN MEDICAL ASSOCIATION. Transactions of the Section on
Genito-Urinary Diseases, 1916. (*American Medical Association Press*) M. 15.
- BIRK, WALTER. Leitfaden der Kinderheilkunde
(*Marcus and Webers' Verlag.*) M. 18.60
- COBB, IVO GEIKIE. A Manual of Neurasthenia
(*Baillière, Tindall & Cox*) 12s. 6d.
- DURET, H. Traumatismes Cranio-Cerebraux . . . (*Lib. Félix Alcan*) Frs. 75
- FELDMAN, W. M. The Principles of Ante-Natal and Post-Natal Child
Physiology (*Longmans Green & Co.*) 30s.
- JONES, ERNEST. Treatment of the Neuroses (*Baillière, Tindall & Cox*) 10s. 6d.
- LAROQUETTE, F. M. DE. Atlas for Electro-diagnosis and Therapeutics
(*Baillière, Tindall & Cox*) 15s.
- MINETT, E. P. Practical Tropical Sanitation (*Baillière, Tindall & Cox*) 4s. 6d.
- OVEREND, WALKER. The Radiography of the Chest. Vol. I., Pulmonary
Tuberculosis (*Wm. Heinemann (Medical Books) Ltd.*) 17s. 6d.
- PATON, D. NOEL. Essentials of Human Physiology
(*Wm. Green & Sons, Ltd.*) 25s.
- PILON, H. The Coolidge Tube (*Baillière, Tindall & Cox*) 7s. 6d.
- REDDING, J. MAGNUS. Aids to Electro Therapeutics
(*Baillière, Tindall & Cox*) 5s.
- REPORT of Department of Health, New Jersey (*Trenton*) —
- SABERTON, CLAUDE. Diathermy in Medical and Surgical Practice
(*Cassell & Co.*) 7s. 6d.
- SHORT, A. RENDALL. The New Physiology in Surgical and General
Practice (*John Wright & Sons, Ltd.*) 9/6 Paper covers, 7s. 6d.
- SILK, J. FREDERICK W. Modern Anæsthetics (*Edward Arnold*) 7s. 6d.
- THOMSON and MILES. Operative Surgery
(*Henry Frowde and Hodder & Stoughton*) 16s.
- WARBASSE, JAMES PETER. Surgical Treatment, Vols. II. and III.
(*W. B. Saunders Co., Ltd.*) Set of Three, £6, 6s.
- WHITE, R. PROSSER. Occupational Affections of the Skin
(*H. K. Lewis & Co., Ltd.*) 25s.
- WHITE, WM. A. The Mental Hygiene of Childhood
(*Wm. Heinemann*) 6s.
- WHITTAKER, CHARLES R. Surface Anatomy (*J. & A. Churchill*) 7s. 6d.

ANALYTICAL NOTE.

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AMONG invalid foods none are better known than Brand's Essences of Beef, Mutton, etc. The firm's products also include a most palatable calves'-foot jelly suitable for convalescents. The essences consist solely of the juice of the finest meat, extracted by heat, without the addition of water or any other substance whatsoever; they contain therefore the most stimulating and exhilarating properties of the meat in easily assimilated form. Brand's Essences provide an easily digestible form of nourishment suitable for conditions of debility, gastric enfeeblement, exhaustion after hæmorrhage, childbirth, or operation.

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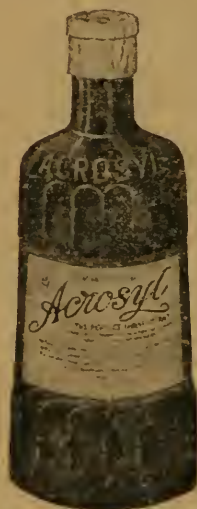
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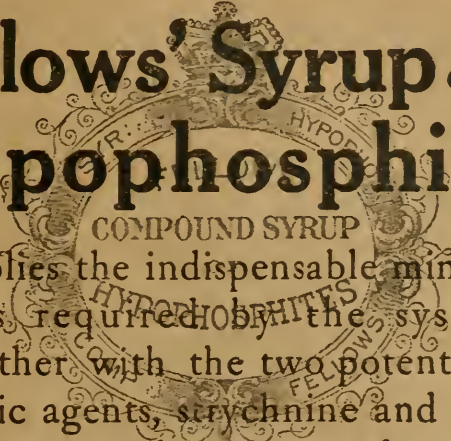
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